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American Foundryman

February 1944

Standardized Chill Tests Can Be a "Measuring Stick" For the Exchange of Data

CHILL Tests, of one type or another, are in regular use in most gray iron foundries today. Many foundries check every ladle of iron by means of this test. This practice permits rapid inspection of quality at a most important stage of production; namely, before the casting is made.

When correctly used, the Chill Test facilitates a reduction in the number of subsequent rejects due to "off color" analyses, properties, and machining characteristics. Experienced operators are able to use this test for surprisingly accurate estimates of hardness, strength, machinability and general suitability. Even inexperienced operators are able to identify incorrect analyses and types of iron when a standard practice is established for them.

The use of the Chill Test has been seriously handicapped by the lack of uniformity of test conditions and specimens within the industry. The use of a standardized test would be of unusual value in facilitating the exchange of information on the chilling characteristics of gray iron.

The Chill Test Committee is studying the existing types, sizes and shapes of specimens used as a chill test. This study will also cover the effect of those factors which may influence the accuracy of the test. This information will be made available to the industry in the near future, with the first report expected during the 1944 A.F.A. War Congress in Buffalo, April 25-28.

As soon as possible a tentative standard will be set up and used in a number of foundries, under controlled conditions. Eventually this study should lead to definite recommendations covering types, sizes, shapes and methods of handling Chill Tests for optimum results.

Obviously, work of this type requires the cooperation of as many foundrymen as possible. Any foundryman using a Chill Test in his practice should have an interest in this work. He can be of valuable assistance by submitting two unbroken chill test specimens to the Committee, together with a brief letter explaining his reactions to the particular specimen he is using.

Tom Barlow

T. E. BARLOW, *Chairman*,
A.F.A. Gray Iron Division,
Committee on Chill Tests

THOS. E. BARLOW also is serving as Chairman of the A.F.A. Subcommittee on Inoculated Iron, Gray Iron Div., and he has been active in the work of compiling a revision of the Alloy Cast Irons book. At present he is associated with the Vanadium Corp. of America, Detroit, as foundry engineer. His previous experience in the foundry field includes work as chief metallurgist of a large automotive jobbing foundry in Detroit, and metallurgical research work for the Copper, Iron and Steel Development Association and Battelle Memorial Institute.

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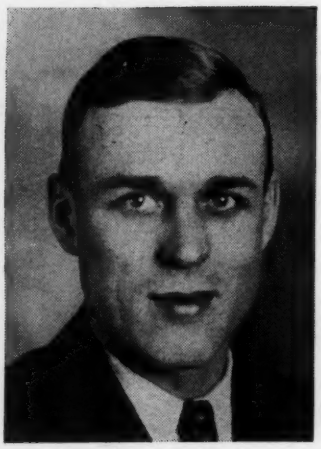
A.F.A. Officers and Directors Nominated

Ralph J. Teeter
President

Fred J. Walls
Vice-President



Frank J. Dost
Director

S. D. Russell
Director

Joseph Sully
Director

L. C. Wilson
Director

RALPH J. TEETOR, President, Cadillac Malleable Iron Co., Cadillac, Mich., was nominated to succeed L. C. Wilson, Gen. Mgr., Reading Steel Casting Div., American Chain & Cable Co., Reading, Pa., as president of the American Foundrymen's Association, at a meeting of the A.F.A. Nominating Committee held in Chicago on January 11. At the same time, Fred J. Walls, International Nickel Co., Inc., Detroit, was nominated for the vice presidency. Both the presidency and the vice presidency are for one-year terms.

The following were nominated at the same meeting to become directors for three-year terms:

Frank J. Dost, Sterling Foundry Co., Wellington, Ohio.

S. D. Russell, Phoenix Iron Works, Oakland, Calif.

R. T. Rycroft, Pres., Jewel Alloy and Malleable Co., Inc., Buffalo, New York.

Joseph Sully, Pres., Sully Brass Foundry, Ltd., Toronto, Ont., Canada.

L. C. Wilson, Gen. Mgr., Reading Steel Casting Div., American Chain & Cable Co., Reading, Pa., retiring president of the Association.

The annual election of officers and directors is held at the annual business meeting of the Association, which will take place during the Third War Production Foundry Congress, Buffalo, N. Y., April 25-28, inclusive. The meeting of the Nominating Committee was held in accordance with the By-laws of your Association, to name candidates for the office of president, vice president, and for each directorship that shall become vacant at the close of the annual meeting of the Board of Directors.

The report of Nominating Committee Chairman Shannon is published in accordance with Article IX, Section 4, of the By-laws, which requires that the chairman report to the Secretary of your Association the names of nominees and that the secretary report the results of the Nominating Committee meeting to the membership at least 60 days before the annual business meeting of the Association.

According to Article IX, Section 1, of the By-laws, the Nominating Committee consists of the last three living past presidents of the Association and four other members elected by the membership of the Association at the annual business meeting, preceding their year of service. The four members of the 1944 Nominat-

ing Committee to serve with the last three living past presidents were elected at the 1943 annual business meeting of the Association. The membership of the 1944 Nominating Committee is as follows:

Past President L. N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala., *Chairman.*

Past President D. P. Forbes, Gunite Foundries Corp., Rockford, Ill.

Past President H. S. Simpson, National Engineering Co., Chicago.

L. C. Farquhar, American Steel Foundries, East St. Louis, Ill.

J. H. Lansing, Malleable Founders' Society, Cleveland.

Wm. Romanoff, H. Kramer & Co., Chicago.

F. G. Sefing, International Nickel Co., Inc., New York.

Retiring Directors

Directors whose terms expire at the 1944 annual meeting of the Board of Directors are as follows:

R. J. Allen, Worthington Pump & Machinery Corp., Harrison, N. J.

J. G. Coffman, Los Angeles Steel Casting Co., Los Angeles.

M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill.

Vaughan Reid, City Pattern Foundry & Machine Co., Detroit.

L. N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala.

Directors Continuing

Directors who will continue to serve on the Board following the 1944 annual meeting of the Board of Directors are as follows:

J. E. Crown, U. S. Navy Yard, Washington, D. C.

D. P. Forbes, Gunite Foundries Corp., Rockford, Ill.

Roy M. Jacobs, Standard Brass Works, Milwaukee, Wis.

Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.

Harry Reitinger, Bethlehem Steel Co., Bethlehem, Pa.

H. S. Simpson, National Engineering Co., Chicago, Ill.

I. R. Wagner, Electric Steel Castings Co., Indianapolis, Ind.

W. B. Wallis, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, Pa.

S. V. Wood, Minneapolis Electric Steel Castings Co., Minneapolis.

W. L. Woody, National Malleable & Steel Castings Co., Cleveland.

All members nominated for officers and directors are well known for their contributions to the industry and the Association. Ralph Teetor, in addition to serving three years as an A.F.A. director and vice president of your Association, has been active in the work of the Malleable Division and of the Western Michigan Chapter.

Fred Walls, nominated for the vice presidency, needs no introduction. Mr. Walls has been extremely active in Association and industry work. He has served three years as a member of the Board of Directors of your Association, and at present is serving as chairman of the Gray Iron Division. The committees of the Association on which Mr. Walls has served, either as a member or as chairman, are too numerous to mention. He also has been active in the Detroit Chapter, serving as a member of its Board of Directors, and also president of the predecessor organization, the Detroit Foundrymen's Association.

Frank Dost has been interested in the committee work of the Association and particularly in the activities of the Northeastern Ohio Chapter, of which he is a past chairman.

Sam Russell, who has been nominated to represent the West Coast on the Board of Directors, is a past chairman of the Northern California Chapter.

Ralph T. Rycroft, a present director of the Western New York Chapter, guided the group during the 1942-43 season as Chapter President.

Joseph Sully was one of the organizers of the Toronto Chapter, and served as its first chairman.

Lee Wilson's service to the Association is well known. In addition to serving as present president, he has served as vice president, a three-year term on the Board of Directors, and has been very active in the committee work of the Steel Division of the Association.

Midyear Meeting for A.F.A. Directors

THE Board of Directors of A.F.A. held its midyear meeting on January 13 at the Palmer House, Chicago, to hear reports of its officers and progress made during the first half of the fiscal year.

With President L. C. Wilson presiding, Past President D. P. Forbes, Chairman of the Finance Committee, reported on the financial status of the Association. Chairman of the National Membership Committee, R. J. Teetor, Association Vice President, reported an increase of 296 in membership up to December 31, 1943.

Secretary R. E. Kennedy reported on progress being made on special publications, of new chapters already organized or in the process of organization, and on plans for the 1944 Third War Production Foundry Congress.

W. W. Maloney and C. E. Hoyt, Assistant Secretary and Treasurer, respectively, reported on plans for the 1944 exhibit and on the preconvention issue of *American Foundryman.*

C. E. Hoyt reported on the proposed changes in the By-laws, which had been approved by the Executive Committee at a meeting on January 12. Following the report, the amended By-laws were unanimously approved by the Board of Directors for submission by letter ballot vote to the membership of the Association. The letter ballots have been, or soon will be, mailed to Association members.

Standard Brass Works Reaches 50-Year Mark

SINCE that day in January, 1894, when Fred Werner and Arthur Schenck poured the first batch of sputtering brass into the first mold a full 50 years have passed, now culminating in the Golden Anniversary of the founding of the Standard Brass Works of Milwaukee.

In 1900 K. W. Jacobs became president of the firm and remained its head until 1925 when he retired. Since then the business has continued under the direction of his son, Roy M. Jacobs, as president. Plant manager is A. H. Schott, the vice-president and a molder of the "old school." B. E. Jacobs is secretary; Viola Schmidt is treasurer, and K. W. Jacobs, Jr., is serving as a director.

The Future of Magnesium Castings

By Dr. D. Basch

Consultant on Materials and Processes, General Electric Co., Schenectady, N. Y.

This paper, dealing with the growth and usage of magnesium castings, was presented before the October 8, 1943, meeting of the A.F.A. Philadelphia Chapter

MAGNESIUM has had a potent "shot in the arm" because, due to war exigencies, industry has been forced to use magnesium in such vast quantities, and for such a variety of purposes, that a splendid background of practical experience in handling the material and of performance under all kinds of service, has been created. Under other conditions, it would have taken many years of slow tryouts and watchful waiting on the part of the engineers to secure equal experience. Magnesium metallurgists and technologists now have a clearer vision of where specific research and development is most needed to adequately build up their fences.

Production of magnesium now averages about 600,000,000 lb. per year, where in 1939 it was about 10,000,000 lb. for all purposes. Production of magnesium now exceeds consumption so that a good deal of it goes into a stockpile. However, after the war some of the producing plants undoubtedly will terminate operation, since their production cost, at least as it looks now, will not be competitive with other producing processes for magnesium.

What About Magnesium?

The established advantages of magnesium are:

1—Light weight:

	lb. per cu. in.
Magnesium	0.065
Aluminum	0.1
Cast Iron	0.260
Steel	0.285
Brass	0.307
Copper	0.322

2—Excellent machinability.

3—Excellent damping characteristics (reduces amplitude of transmitted vibrations). It is better than aluminum and useful for radio and communication work.

4—High fatigue strength.

5—Non-sparking property.

6—Non-magnetic property.

Definite disadvantages of magnesium are:

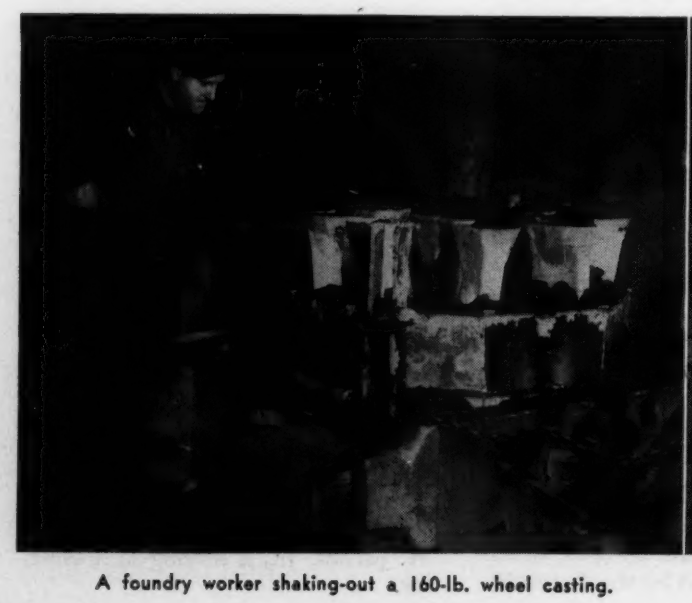
1. *Modulus of Elasticity.* Modulus of elasticity is 6.5 million psi., against 10 million psi. for aluminum and about 28 million psi. for steel. Where stiffness against deflection is needed, magnesium must be about 17 per cent thicker in sections or must be stiffened by ribs or other means. Low modulus, when coupled with relatively high elastic limit as in magnesium alloys, is sometimes a distinct advantage as to resilience.

2. *Thermal Expansion.* Thermal expansion per °F. of magnesium is greater than aluminum, as indicated in the following:

Magnesium	0.000016
Aluminum	0.000013
Steel	0.0000066
Cast Iron	0.000006

3. *Corrosion.* Commercial magnesium products have fairly good corrosion resistance to ordinary atmospheric influences, unless submerged or kept wet in sea water, or exposed to tropical humid climates. Magnesium alloy castings exposed for several years near the seacoast of Point Judith without special surface protection have not shown any noticeable decrease in strength or surface deterioration. There is considerable variation in different compositions.

New developments have brought out compositions in which the most injurious elements, nickel and iron, are kept to low limits. In commercial purity alloys, the loss when tested by alternate immersions in seawater, varies from 5 to 100 milligrams per square centimeter per day, showing the great variation in the compositions. The high purity alloys lose 0.15 milligrams per square centimeter per day, ± 0.05, which is considerably better and more uniform. However, in the same test, copper loses about 0.12 milligrams per square centimeter per day, which, considering the weight ratio, means that the depth of corrosion of high



A foundry worker shaking-out a 160-lb. wheel casting.

Molten magnesium is taken to molds in rubber-tired buggy.

Pouring a landing wheel with two crucibles.

purity magnesium is still about six times that of commercial copper. The loss for tin bronzes is only half that of commercial copper.

From a corrosion standpoint, even the high purity magnesium alloys should not be used where they are immersed or constantly wetted by salt water, or where they are exposed to humid tropical climates. Protective coatings are a help, but are effective only as long as they are not broken.

4. *Effect of Temperature.* While subnormal temperature has no marked effect on the physical properties of magnesium, a temperature above normal reduces the properties more than for aluminum. Magnesium should not be used where exposed to temperature above 300°F. for any great length of time.

5. *Notch Fatigue.* Magnesium is particularly susceptible to the effect of concentrated stresses as caused by notches, sharp corners, etc. In designing magnesium alloy parts, it is highly important to avoid points of concentrated stress by distributing loads and pressures over larger areas, rounding off all corners, liberal filleting, and very gradual change of section.

Certain other properties are not exactly disadvantages or advantages, such as magnesium, being a softer material than aluminum, is likely to show somewhat lower creep values. However, due to the rapid work hardening of magnesium, the initial primary creep period is finished within 2 days, after which the secondary creep starts with a straight gradual increase. Creep loads within the elastic limit impose elongations usually within the permissible limits of the design.

Shock Resistance. Shock resistance of magnesium is somewhat less than for aluminum for shocks imparted by external forces, such as hammer blows, projectiles, etc., but, due to lower weight, is better than aluminum for shocks due to dropping.

Features Pertaining to Castings

Magnesium alloy castings are subject to two primary considerations:

1. The low thermal capacity (specific heat) makes possible rapid and economical melting. However, it also makes for rapid cooling in the mold so that, in sand as well as in metal molds, it is important to get the metal into the mold and to fill the mold completely as quickly as possible. Furthermore, its low specific gravity means that molten magnesium does not differ greatly in weight from non-metallic inclusions and that the pressure of the pouring head is relatively low.
2. Some type of inhibitor must be present in green as well as dry sand to prevent reaction between moisture and molten magnesium and also to produce a non-oxidizing atmosphere within the mold cavity. A synthetic sand is generally used to obtain accurate control.

Compensating Features

These two points are disadvantages in that they add somewhat to the cost and the ease of manufacture. There are some compensating features as follows:

1. Magnesium alloy castings differ from castings and most metals in that there are definite and positive means of controlling the grain size by superheating. The coarse structure often encountered in heavy sections, for instance in aluminum, is largely eliminated. For this reason, the properties of test specimens cut from magnesium alloy castings approach more closely those of separately cast test bars.

Although there is some difference in grain size between heavy and light sections in magnesium alloy castings, the difference is not nearly so marked as that encountered in other metals.

In fact, the presence of microshrinkage (intergranular shrinkage cavities) is about the only marked reason for a difference in properties between specimens cut from a casting and separately cast test bars. Even in castings which contain the normal amount of microshrinkage, it generally will be found that the average of test bars cut from a casting will be about 80 to 85 per cent of separately cast bars. On other material, such as aluminum, the ratio is considerably lower.

Thin casting walls require accurate setting of cores.

2. Microporosity, unfortunately, is hard to avoid in magnesium alloys. It will vary with the alloy, depending on the freezing range. Compositions high in aluminum are less subject to it, than those lower in aluminum.

Microporosity cannot easily be detected by x-rays, due to the low density of magnesium and the lessened contrast between metal and voids. On the other hand, microporosity becomes structurally dangerous only when it is visible to the naked eye. Fractures of sample castings will give a reliable indication. Microporosity can be controlled to some extent by gating and chilling. Magnesium alloy sand castings are not so susceptible as aluminum to so-called pin hole porosity.

3. Magnesium alloy castings when heat treated do not air age into the final condition with higher tensile and lower elongation as rapidly as aluminum alloy compositions. Aluminum takes about 3 months to reach the final conditions with simple air aging, whereas magnesium alloys take years. As a result, in many cases magnesium alloy castings can be used in the solution treated condition (heat treated but not aged) with the much higher elongation, greater shock resistance and greater deformability without fear of losing these properties after a short time. When subjected to elevated temperature, the air aging of magnesium alloys progresses more rapidly, so that under such conditions fully aged castings should be used.

Relative Yield

In general, an average figure for the yield of magnesium alloy sand castings compared with aluminum, primarily due to the effect of low thermal capacity, is 2¾ lb. poured to each pound of good aluminum castings (for the most commonly used alloy with 4 per cent copper) and 5 lb. poured to each pound of good magnesium castings. These figures vary considerably for different jobs.

Another comparison can be made by taking the average cost per lb. of good aircraft castings which, at least in our foundry, is about $2.55 for magnesium alloy (heat treated) against $1.75 for aluminum (heat treated). This indicates that, considering the weight ratio of 2 to 3, the cost of magnesium alloy sand castings is not far from aluminum. These figures may vary somewhat in different cases, but the differential for magnesium castings is surprisingly low.

Table 1

COMPARISON OF ALUMINUM AND MAGNESIUM SAND CASTINGS

Production of Magnesium Alloy Sand Castings

Year		*lb. Mfgd.*
1939		1,321,080[1]
1941		1,753,000[2]
1942	First 6 months	13,974,000[2]
	Second 6 months	18,789,000[2]
	Whole year	32,763,000
1943	First 6 months	26,337,000

Production of Aluminum Alloy Sand Castings

1942	Whole year	207,488,000[2]
1943	First 6 months	142,446,000[2]

Physical Properties of Magnesium Alloy Sand Castings (Two common alloys)

Composition: 6 per cent Aluminum, 3 per cent Zinc: Heat treated but not aged
32,000 psi. Tensile Strength, 10,000 psi. Yield Strength, 7 per cent Elongation Min.
—H.T. and aged
34,000 psi. Tensile Strength, 16,000 psi. Yield Strength, 3 per cent Elongation Min.
Composition: 9 per cent Aluminum, 2 per cent Zinc, H. T. but not aged
32,000 psi. Tensile Strength, 10,000 psi. Yield Strength, 6 per cent Elongation Min.
—H.T. and aged
34,000 psi. Tensile Strength, 18,000 psi. Yield Strength, 1 per cent Elongation Min.

Physical Properties of Aluminum Alloy Sand Castings

Composition: 4 per cent Copper
29,000 psi. Tensile Strength, 6 per cent Elongation—H.T. but not aged
32,000 psi. Tensile Strength, 20,000 psi. Yield Strength, 3 per cent Elongation Min.
—H.T. and aged

[1] Sand and permanent mold castings.
[2] Sand castings only.

Machining

The cost of magnesium alloy castings may come down still further as practices in foundry and new metallurgical developments are perfected. Due to the rapid work hardening and the low modulus of elasticity, magnesium alloy castings, which require considerable machining, may require more care in machining than aluminum and other materials to prevent deflections and distortions.

Careful supporting, and in many cases strain relief after rough machining and straightening, may be necessary. Strain relief is usually carried out at about 400-500°F. for 3 to 6 hours depending on the casting.

GROWTH OF USAGE

At this point, some statistical data about the tremendous increase in magnesium alloy sand castings (and in comparison of aluminum alloy sand castings) may be of interest. See Table 1.

Permanent Mold Castings

The use of permanent mold magnesium alloy castings, which is particularly favorable where production is not high enough to justify the expensive dies of die castings, but high enough to permit the lower cost of permanent molds to obtain castings, requiring less machining, also is increasing steadily. From about 20,000 lb. per month in the latter part of 1941, they increased to about 300,000 lb. per month, exclusive of bombs, during the first part of 1943. Magnesium alloy permanent mold castings can be heat treated and also superheated for grain refinement like sand castings.

Die Castings

Pressure die castings of magnesium alloys are finding many applications, due to the fact that many jobs in war time are used in such quantities that, in spite of the high die cost, die castings become commercially feasible. Furthermore, pressure die castings offer the shortest

High-speed band saws for trimming off gates and risers.

and most direct route from the raw material to the finished product with the greatest saving of strategic material, man hours, and machine hours in casting and machine shops. Magnesium alloy pressure die castings do not lend themselves to heat treatment, but some improvement in physical properties is obtained from the rapid chilling of the metal die which brings them to about the same figures as for fully heat treated and aged sand castings. Magnesium alloy pressure die castings have increased from about 60,000 lb. per month in the last few months of 1941 to about 250,000 lb. per month in 1943.

It may be assumed that after the war, when production quantities will be materially reduced, the use of magnesium alloy die castings will decrease, temporarily at least, unless die costs can be greatly lowered. There will, however, be many new applications for commercial products, such as portable sewing machines, typewriters, business machines, portable tools, vacuum cleaners, floor polishers, radios, transportation, reciprocating machinery, rotating apparatus and many others. The same die casting machines may be used for aluminum and magnesium.

Centrifugal Castings

Magnesium and aluminum are not well adapted to centrifugal casting. One of the greatest advantages of iron and brass centrifugal castings is the so-called self-cleaning action which, due to the centrifugal force, throws the heavier base metals toward the periphery and holds the oxides and non-metallic inclusions in the center section, which is usually machined out. The remaining metal section thus is clean of the non-desirable elements.

In magnesium and aluminum, the oxides are heavier than the base metals and, therefore, the non-desirable elements are thrown toward the outside periphery. The most valuable part of the casting, where the structure is most attractive, due to the high centrifugal force, must be machined off.

Post-War Possibilities

Magnesium alloy ingots of "A" purity now cost about 20-21 cents per lb., aluminum alloy ingots about 15 cents per lb. Considering the weight ratio, the prices of aluminum and magnesium alloy ingots are kept in balance.

Rotary files for clean-up work.

There is a great deal of speculation about post-war prices. Of course, no one knows exactly what will happen but there seems to be a general feeling among metal producers, etc., that, after the war, the price of primary aluminum ingot will be around 10 cents per lb., a secondary aluminum around 6 cents per lb., primary magnesium around 15c per lb., and secondary magnesium around 10 or 11 cents per lb. The ratio of these prices is fairly close.

If these figures are correct (and I repeat that so far they are only guesses), following again the weight ratio and competing with primary magnesium, brass ingot would have to sell for about 5 cents per lb., cast iron pigs about 4 cents per lb. Competing against secondary aluminum, which is being used in ever increasing quantities in the foundry, brass ingot would have to sell for about 2 cents per lb. and pig iron for about 2.3 cents per lb. The actual casting cost, of course, will be affected by other factors aside from the basic metal cost.

Some of the new developments that may be forecast in the field of magnesium alloys are:

1. New alloy compositions to shorten the solidification range, to reduce danger of microporosity.
2. New alloy compositions to yield high physical properties without high temperature heat treatment.
3. Improved corrosion resistance of magnesium alloys, especially against salt water and tropical humidity.
4. Improved protective coatings for magnesium.
5. Improved die casting technique and alloy compositions for pressure die castings to make possible high temperature heat treatment with corresponding properties. (Improve structure and density).
6. Development of fluxes which are less destructive on steel work in magnesium plants.
7. Adaptation of magnesium alloys to plaster molding process as now used for brass and aluminum.
8. Tightening of precautions and handling routines in castings and machine shops to eliminate unnecessary fires and explosions which prejudice users against magnesium.
9. Development of bearing and sliding wear properties of magnesium alloys.

Committee Holds Core Test Meeting

THE Core Test Committee, Foundry Sand Research Project, met at the Statler Hotel, Cleveland, January 14, under the chairmanship of E. C. Zirzow, National Malleable & Steel Castings Co., Cleveland. Practically full attendance enabled the Committee to cover considerable ground.

Many core tests now included as standards and tentative standards in the present book entitled "Testing and Grading Foundry Sands and Clays" were reviewed and revised, and will be submitted to the Executive Committee for approval. New tests on which the Core Test Committee is working include those on the strength of core paste, core stickiness, and effect of moisture on the strength of cores. Work on the test for determining the strength of core paste has progressed to the place that the Committee soon recommend this test to the Executive Committee as a tentative standard.

Cooperative work among committee members on several tests suggested to determine the relative stickiness of core sands is being undertaken and is expected to be completed in the relatively near future.

Work on a test to determine the effect of moisture on the strength of cores also is under way.

As an indication of the interest shown at this meeting, and the large amount of work accomplished, the meeting of the Committee began promptly at 10 a.m. Friday morning and adjourned at 10:15 p.m.

How to Change the Properties of Sand--II

By N. J. Dunbeck
Eastern Clay Products Co., Eifort, Ohio

Part II of this article, dealing with the selection and correct use of sand to achieve the desired casting results for specific kinds of work, appeared in the January issue of "American Foundryman." This second and final instalment of Mr. Dunbeck's article begins with the "Effect of Other Additions" on core mixes.

IRON oxide has proven a beneficial addition to core mixes since it reduces cracking and shattering of the core from heat shock when metal is poured.

It also has value, when added to some types of clays, in setting up higher hot strengths, as shown in Table 6, Section (a).

Silica Flour

Most foundrymen know that an addition of silica flour reduces penetration and makes a harder mold after drying and cooling. It is important to know that silica flour additions very much increase the hot strength of bond clays, as indicated in Table 6 (b).

Therefore, hot strength may be increased:

1. By more intensive mixing.
2. By increasing the moisture content.
3. By harder ramming.
4. By using a different clay or combination of clays.
5. By using more clay and more water.
6. By adding auxiliary binders.
7. By using special hot strength binders.
8. By using special addition agents.
9. By increasing fines.

Hot strength of a sand mixture may be reduced:

1. By decreasing the moisture content.
2. By softer ramming.
3. By using less clay.
4. By using a different type of clay.
5. By decreasing fines.

Permeability

Permeability is the ability of a sand to vent gases and has no relation to the amount of gas to be vented.

Effect of Gas Content

It is important to remember that a wet sand will generate much more water than a dryer sand. At atmospheric pressure, one lb. of water will create 26.3 cu. ft. of steam. One lb. of water occupies 27.7 cu. in. and produces 45,394 cu. in. of steam.

Water expands, therefore, 1638 times in volume in changing into steam, under assumed foundry conditions, which gives us some idea of the pressure which must be relieved in venting this gas. If we drive off only 2 per cent of water from a mold containing 2 cu. ft. of sand, we have created 105 cu. ft. of steam at atmospheric pressure. Most of this steam is not visible, particularly on warm days.

Naturally bonded sands require a greater amount of tempering water than synthetic sands and must, therefore, have higher permeability.

Effect of Sea Coal

The amount of sea coal or other gas forming elements in the sand must also be considered. These fine materials reduce permeability because of their bulk and add considerably to the amount of gas to be vented.

The use of fuel oil to prevent drying out of sand usually permits a substantial reduction in amount of sea coal necessary.

If the sea coal is replaced by one third its volume of pitch an equal cleaning action will be obtained, less gas will be evolved, the sand will have higher dry strength and resistance to cutting, but it will also be more difficult to shake out.

Effect of Ramming

Permeability decreases as mold hardness increases for the same sand. Permeability, shown by the uniformly rammed laboratory specimen, may be adequate for a soft rammed job but too low for harder rammed work.

Effect of Thickness of Sand

Permeability decreases as thickness of sand increases. A sand which gives adequate venting through a shallow cope or drag may be too tight for a deep flask. We must think of permeability not in terms of the laboratory result, but in relation to the amount of gas to be evolved, the hardness of the mold and thickness of the sand.

Effect of Flask Equipment

After spending time and money in preparing a sand with venting ability, it is not good practice to use solid flasks and solid bottom boards. We have frequently observed that a bad blow condition can be immediately overcome by simply burning a few holes in a metal bottom board. Also, that an expensive, open sand being used in solid flasks can be replaced by a cheaper, finer sand when perforated flasks are used, with resultant better finish.

Table 6

Effect of Iron Oxide and Silica Flour Additions on Hot Strength

(a)—IRON OXIDE ADDITIONS:

Southern bentonite, per cent	Fe_2O_3, per cent	Tempering Water, per cent	Green Compression Strength, psi	Dry Compression Strength, psi	Sintering Point, °F.	Hot Strength at 2000°F., psi
4.0	.0	2.0	10.8	38	2410	25
4.0	1.0	2.0	8.0	44	2400	100

(b)—SILICA FLOUR ADDITIONS:

Southern bentonite, per cent	Silica Flour, per cent	Tempering Water, per cent	Green Compression Strength, psi	Dry Compression Strength, psi	Sintering Point, °F.	Hot Strength at 2000°F., psi
3.5	.0	2.0	8.1	27	2440	30
3.5	10	3.1	6.6	105	2550	180
3.5	20	4.9	7.6	135	2640	380

Effect of Clay Content

Permeability usually decreases as the clay content of one particular type clay increases.

Effect of Type of Clay

The type as well as the quantity of clay used has a most important effect on permeability, as shown in Table 7.

Effect of Water Content

Permeability is usually highest when sand is in proper molding condition and decreases as sand is run dryer or wetter. Since most sands are run on the wet side, we can say that usually permeability decreases as water content increases. This probably results from closer ramming of the wetter sand.

Effect of Mixing

With more efficient mixing, green strength increases and permeability decreases. Since efficient mixing permits a reduction in amount of clay, it actually results in higher permeability.

Effect of Skin or Oven Drying

Drying increases permeability but, more important, it increases effective permeability since it reduces the amount of gas to be vented. Skin dried molds usually give better castings than green sand molds because they are stronger, have higher permeability, and because the metal lies quietly on the dry surface.

Effect of Grain Distribution

Uniform distribution of grain on a few sieves gives much higher permeability than a scattered distribution.

Upon the addition of coarse sand to open up a finer sand, no appreciable effect is obtained until 30 per cent or more of the coarse grain has been added. Up to that point, the fine grains pack around the coarse grains with no increase in permeability and in some cases a decrease.

In closing up a coarse sand, however, an addition of only 5 to 10 per cent fine sand will be effective in substantially reducing permeability.

Effect of Fines

Fines reduce permeability. The effect is minor with a small per cent of fines present, but increases substantially as per cent of fines increases.

Table 7

Effect of Type of Clay on Permeability

	Per Cent Clay	*Per Cent Water*	*Green compression Strength, psi*	*Permeability*
Fire clay	10	3.3	8.7	103
Southern bentonite	4	2.5	9.9	180
Western bentonite	5	2.5	9.6	167

Fines must be removed or diluted. They may be washed from the sand or removed by suction. The usual practice is dilution by the addition of sand which is low in fines. Burnt core sand is an excellent material for this purpose. Therefore, mold permeability may be increased:

1. By reducing water content.
2. By softer ramming.
3. By reducing sea coal or replacement with pitch.
4. By using perforated flasks and bottom boards.
5. By wire venting.
6. By reducing clay content.
7. By changing type of clay.
8. By drying mold.
9. By using sand with grain concentrated on a few meshes.
10. By reducing per cent of fines.

Permeability may be decreased by the reverse of the above.

Flowability

Flowability is that property of sand which permits it to be easily rammed into a hard mold face with a minimum of effort. A soft, smooth feeling sand usually has high flowability, while a sticky, gummy sand will have low flowability.

High flowability is essential to best finish but high flowability may also result in sand grains being rammed so close together that rat tails or buckles will result.

Effect of Mixing

Flowability increases as mixing becomes more thorough and efficient.

Effect of Water

Flowability is at a maximum in properly tempered sand and decreases as sand becomes dryer or wetter.

Effect of Amount of Clay

Flowability decreases as clay content increases.

Effect of Type of Clay

This is the most important factor affecting flowability. Southern bentonite gives the best flowability, illite and kaolinite clays give fairly good flowability and Western bentonite gives poor flowability.

Effect of Fines

Fines reduce flowability.

Effect of Sea Coal

Sea coal reduces flowability.

Effect of Auxiliary Binders

Resin binder increases flowability notably, pitch reduces flowability and cereal binder reduces flowability faster than any other binder.

Effect of Grain Distribution

Uniform grained synthetic sands have much higher flowability than do naturally bonded sands. A striking example is an aluminum foundry in which a uniform 105 average grain fineness sand is bonded with Western bentonite. A low bond, 220 average grain fineness naturally bonded sand is also in use. The comparatively coarse synthetic sand is giving definitely better finish than the much finer natural sand.

Since the Western bentonite does not give particularly good flowability and since the naturally bonded sand is low in bond, the effect of the clay in this case is minor and it is the uniform grain distribution which accounts for excellent flowability and finish. If Southern bentonite were substituted for Western bentonite in this synthetic mix the finish would be further improved. Therefore, to increase flowability:

1. Mix sand more thoroughly.
2. Temper correctly to best molding condition.
3. Reduce clay content.
4. Use type of clay which gives maximum flowability.
5. Reduce fines, sea coal and auxiliary binders.
6. Use sand of uniform distribution.

To reduce flowability:

1. Increase clay content.
2. Use clay of low flowability.
3. Increase fines, sea coal and

auxiliary binders such as cereal binder.

4. Use less uniform base sand.

Deformation and Resilience

Deformation is the amount a sand gives or yields before it breaks. When deformation is multiplied by green strength times 1000 we get resilience or sand toughness. Resilience can be considered the toughness or springiness of a sand. A sand of low resilience is said to be brittle. Brittle sand may be the cause of broken mold edges, drops, crushes, dirt and difficulty in finishing the mold. High deformation may cause cuts, overweight castings and swells.

Effect of Mixing

Deformation decreases with intensity of mixing. Deformation is sometimes increased and buckles stopped by cutting about 20 per cent silica sand into a mulled facing by hand shoveling.

Effect of Water Content

Deformation and resilience increase with an increase in tempering water even though the added water decreases green strength. The sand, therefore, may be said to be more workable even though it is wetter and weaker.

Effect of Clay Content

Deformation increases with increased clay content within the workable range of strengths.

Effect of Type of Clay

Western bentonite gives highest deformation, kaolinite somewhat lower and Southern bentonite still lower. There seems to be a general relation to the effect that, as flowability increases, deformation decreases. We, therefore, must decide which property is most essential to the work being made.

Effect of Sea Coal

Deformation increases with sea coal additions up to 6 per cent, after which it decreases.

Effect of Auxiliary Binders

The effects of auxiliary binders are:

Resin binder reduces deformation.

Pitch increases deformation.

Cereal binder very much increases deformation within workable additions.

Effect of Grain Distribution

Uniform grain sands have lower resilience than non-uniform sands. An increase in fines has been found to increase deformation.

Effect of Ramming

Work by Dietert indicates that deformation increases as mold hardness increases. This seems questionable, although it is reasonable that resilience would increase as green strength increased, due to additional ramming. Therefore, deformation is increased by:

1. Less thorough mixing.
2. Increasing water content.
3. Increasing clay content.
4. Selection of proper type of clay.
5. Increasing sea coal, pitch or cereal binder.

Deformation is decreased by:

1. More thorough mixing.
2. Decreasing water content.
3. Decreasing clay content.
4. Selection of proper type of clay.
5. Decreasing auxiliary binders or by changing the type of binder.

Expansion and Contraction

In a synthetic sand, we usually have expansion up to about 1500°F., above which the clay starts to contract. This counteracts further expansion of the silica and may result in a speciman at 2500°F., which is in the size range from slightly larger than original size down to considerably smaller.

Excessive expansion may cause rat tails, buckles, scabs and fins. Excessive contraction may cause scabs and fins.

Heat travels into a mold principally by convection. In high permeability sands, there is not the great heat difference between backing and facing sands that exists in lower permeability sands. In such sands, the expanding backing sand may break the surface of the contracting facing sand and force it into the metal as a buckle.

Flowability has an important effect upon expansion troubles. A reduction in flowability may keep the sand grains far enough apart in the rammed mold face so that they can expand without breaking the mold face.

Effect of Mixing

Expansion increases with more intensive mixing.

Effect of Clay Content

Expansion is reduced by increased clay content.

Effect of Type of Clay

The point of both maximum expansion and maximum contraction depends upon the type of clay used. The more refractory clays have lowest contraction and there is probably a significant relationship between sintering point and contraction.

Effect of Fines

Fines expand more than coarse material. It is, however, true that an addition of fines to a uniform sand will usually stop rat tails. This indicates that the fines have greater effect from the reduction in flowability which they cause than from the additional expansion which they contribute.

Effect of Sea Coal

Sea coal and other combustible materials reduce both expansion and contraction.

Effect of Water Content

Expansion is lower and contraction greater in undertempered sands.

Effect of Auxiliary Binders

Cereal binder is a very effective agent in stopping expansion troubles because it greatly reduces flowability. An addition of ¼ per cent or ½ per cent of cereal binder usually will quickly stop any rat tail.

Effect of Ramming

Expansion increases as mold hardness increases. Therefore, expansion may be reduced by:

1. Less intensive mixing.
2. Increased clay content.
3. Selection of proper type clay.
4. Reduced flowability by adding fines of cereal binder.
5. Increased sea coal.
6. Reduced water content.
7. Reduced mold hardness.

When contraction is excessive, it may cause scabs. Contraction may be reduced by:

1. More intensive mixing.
2. Decreased clay content.
3. Selection of proper type clay.
4. Reduced fines.
5. Reduced water content.

Sintering Point

The sintering point, according to present A.F.A. test, is the temperature at which sand fuses to a platinum ribbon. Sand which has a low sintering point will "burn on" to a casting. The sintering point is determined by the refractory value of the sand grains, the refractory value of the bond clay, the quantity of clay present and the amount of casting cleaning element, such as sea coal which may be present.

The most refractory base sands are those high in silica and low in fluxes. The most refractory clays are the kaolinites. Kaolinites or fire clay have a fusion point of 2900 to 3100° F. while the montmorillonites, or bentonites, have a fusion point of about 2400° F.

The bentonites do not reduce the sintering point as much as might be expected, since a smaller quantity need be added for strength and this reduces the fluxing action. If two clays have equal refractory value, the stronger will have the higher sintering point.

The addition of sea coal to sand increases its sintering point. An accumulation of dead clay, sea coal ash and metallic particles in the fines will reduce sintering point. Therefore, to increase sintering point:

1. Use the strongest, refractory clay available.
2. Use the stronger of two clays of equal refractory value.
3. Use a more refractory base sand.
4. Increase sea coal.
5. Reduce fines.

Collapsibility

It is desirable to have a sand which will maintain hot strength long enough to prevent cuts and washes and then collapse to prevent the cracking of castings. Castings are cracked at temperatures much below those which affect the casting surface. Cracks usually occur because the sand in an interior section of mold bakes hard and will not yield when the casting shrinks.

The temperature at which the defect occurs is lower than that which affects casting surface and higher than that which causes difficult shake out and lumpy sand at shake out. The temperature will depend upon section thickness of sand, section thickness of metal and pouring temperature.

From the test results, under previous hot strength paragraphs, the hot strength of various clays and combinations can be obtained. Therefore, to increase collapsibility:

1. Use proper clay or combination.
2. Reduce clay content.
3. Reduce moisture content.
4. Reduce mold hardness.
5. Reduce pitch content.

Lumpy Sand at Shake Out

The relative ease or difficulty of shaking out castings and the amount of lumpy sand at shake out depends upon many factors, such as pouring temperature, length of time before shaking out, water content of sand and type of clay used.

For the general run of production castings, our work indicates the approximate correctness of a test where the sand is heated to 800° F. and cooled before testing. This strength and amount of lumps is in general accordance with actual foundry results. Certain typical test figures are below:

	Strength After Cooling from 800°F., psi
Southern bentonite	20
Western bentonite	55

Therefore, to reduce lumpy sand at shake out:

1. Select proper type of clay.
2. Reduce clay content.
3. Reduce moisture content.
4. Shake out castings more quickly after pouring.
5. Reduce sea coal content.

Amount of Tempering Water Required

The bentonites and bentonitic clays require less tempering water than the fire clays; the stronger fire clays require less water than the weaker clays, and all synthetic sands require much less water than naturally bonded sands. This is due to the fact that the specially prepared clays are stronger and less need be used; also, to the fact that naturally bonded sands contain much silt, which has high surface area and which requires much water for wetting.

Table 8

Effect of Heat on Bonding Strength of Clay

	Western Bentonite	*Fire Clay*
Mold Test Method		
Original Green Compression	4.0	4.3
After 10 heats	1.0	2.25
Relative Loss, per cent.....	75.0	58.1
Oven Test Method		
Original Green Compression	4.0	4.3
After heating to 1400°F.	1.2	4.3
Relative Loss, per cent.....	70.0	0
Hydration and Rehydration Method		
Original Green Compression	4.0	4.3
After heating to 1400°F.	1.0	4.3
Relative Loss, per cent.....	75.0	0

An accumulation of fines in synthetic sand will increase the amount of tempering water required. To reduce the amount of tempering water:

1. Reduce clay content.
2. Use stronger type of clay.
3. Reduce amount of fines.

Durability

Clays lose bonding strength at the rate at which their chemically combined water is driven off by the heat of the molten metal. The best fire clays have the highest durability of any type of clay. Schubert,* of the University of Illinois, reported the results in three types of tests in the 1937 American Foundry Association *Transactions*. They are shown in Table 8.

There is no method to increase the durability of a sand other than changing to a more durable clay.

Drying Out of Synthetic Sand

Because synthetic sands are in molding condition with much

*Schubert, C. E., *"A Correlation of the Physical and Chemical Properties of Clays with the Durability of Molding Sands,"* TRANSACTIONS, American Foundrymen's Association, vol. 45, pp. 661-689 (1937).

less water than in the case of naturally bonded sand, the loss of water by evaporation in hot weather is more noticeable and annoying. Research work is being done on the problem. Both calcium chloride and lithium chloride are yielding promising results. Glycerine is also effective but is rather costly. Common fuel oil is quite effective but creates an annoying smoke.

Present practice is to add enough water at the mixer to give the proper condition at the time and point of use, depending upon temperature and humidity conditions.

Malleable Melting Book

THE symposium on "Malleable Iron Melting," covering papers presented at the A.F.A. St. Louis Foundry Congress, plus a selected group of other papers on the same subject, has brought under one cover a collection of information on the practices and equipment for melting of malleable iron not previously available in book form. This publication is the fourth on malleable foundry practices now available to those interested in that branch of the foundry industry. All have been sponsored by the A.F.A. Malleable Division.

The papers in the new "Malleable Melting Symposium" book of 243 pages are:

Some Principles of Melting Malleable Iron, by H. A. Schwartz.

Open-Hearth Furnace for Production of Malleable Castings, by Leo J. Kelly.

Cupola-Electric Furnace Duplexing of Malleable Iron, by Charles Morrison.

Control of Powdered-Coal-Fired Melting Furnaces, by J. A. Durr.

The Cupola-Air Furnace Duplex Process for Production of Malleable Cast Iron, by F. J. Wurscher.

Melting Malleable Iron with Oil in the Air Furnace, by A. Van Lantschoot.

Brackelsburg Furnace Melting of Malleable Iron, by W. Zeunik and Kenneth Mason.

Melting Cupola Malleable Iron, by H. W. Maack.

Practical Operating Phases of Melting, by J. H. Lansing.

Malleable Foundry Refractory Practice, by C. A. Brashares.

Air-Furnace Cast Iron, by Duncan P. Forbes.

Thermal Balances and Fuel Costs of Malleable Melting Furnaces, by J. H. Hruska.

Notes on the Production of Cupola Malleable Castings, by F. B. Riggan.

Measuring and Controlling Pouring Temperatures and Fluidity, by Carl F. Joseph.

Developments in Melting Malleable Cast Iron, by W. R. Bean.

The Malleable Division is now preparing a Symposium on Heading and Gating Malleable Castings which will be presented before the 1944 Third War Production Foundry Congress at Buffalo April 25-28.

The three other symposia previously mentioned are:

Malleable Iron Castings—Covering uses, metallurgical features, manufacturing processes, physical constants and engineering properties, machineability and corrosion (121 pages, 1931 A.F.A. and A.S.T.M.)

Pearlitic Malleable Cast Iron—Covering Classification, producers' data on various classes and patent literature (32 pages), Symposium of A.S.T.M.

Graphitization of White Cast Iron—Review of the various factors involved and methods used to graphitize white cast iron (174 pages, 12 papers).

New Committee Members

Following are additions and revisions to the A.F.A. Committee personnel, as of December 15:

Foundry Sand Research

Nomenclature Subcommittee—Chairman, Prof. J. R. Moynihan, Head, Materials Testing Laboratories, Cornell University, Ithaca, N. Y.

Core Test Subcommittee—Clarence Hansen, Core Room Supt., Belle City Malleable Iron Co., Racine, Wis.

Grading and Fineness Subcommittee—Bradley H. Booth, Fdy. Engr., Carpenter Bros. Inc., Milwaukee.

Gray Iron Division

Analysis of Casting Defects—Geo. W. Anselman, Sand Technician & Fdy. Service Engr., Goebig Mineral Supply Co., Chicago.

Fred W. Hintze, Salesman, Illinois Clay Products Co., Chicago.

T. E. Egan, Chief Met., Cooper-Bessemer Corp., Grove City, Pa.

Cupola Research, Subcommittee on Fuels and Combustion—Stanley P. Levy, Hamilton, Ohio.

Steel Division

Methods of Producing Steel for Castings—S. D. Baumgardner, Jr., Asst. Fdy. Supt., American Hoist & Derrick Co., St. Paul.

Aluminum-Magnesium Division

Die Casting Subcommittee—R. U. Siena, Sperry Gyroscope Inc., Brooklyn, N. Y.

Cast Metals Handbook Revision—Chairman, N. E. Woldman, Chief Met. Engr., Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.

H. J. Rowe, Met. Engr., Aluminum Co. of America, Cleveland.

W. A. Reich, General Electric Co., Schenectady, N. Y.

L. Brown, Plant Mgr., Magnesium Fabricators Div., Bohn Aluminum & Brass Corp., Adrian, Mich.

C. E. Nelson, Asst. Dir. Met. Research, Dow Chemical Co., Midland, Mich.

Pattern Division

Program and Papers Committee—J. W. Costello, Pattern Supvsr., American Hoist & Derrick Co., St. Paul.

Committee Will Study Sand Deformation

A COMMITTEE on Deformation, Foundry Sand Research Project, is being organized to study and standardize the method for determining green deformation and toughness of foundry sands. William G. Parker, Elmira Fdry. Co., Inc., Elmira, N. Y., has been appointed chairman.

Although this phase of sand testing is, at present, not widely used, there are a number of foundrymen who test sand for green deformation and toughness, and who feel that these tests are of value, and that the time and effort spent in making them is paying dividends.

Chairman Parker, whose address is 509 Hart St., Elmira, N. Y., requests that foundrymen who are using the deformation test get in touch with him, so that the committee may gather information regarding the test, particularly with reference to data and application of either, or both, the green deformation and toughness tests. Those foundrymen who have been making these tests, either now or in the past, are urged to cooperate with Chairman Parker.

Book Review

Tungsten, by K. C. Li and C. Y. Wang, American Chemical Society Monograph Series No. 94, blue cloth bound, 325 pages. Published by Reinhold Publishing Corporation, New York. Price, $7.00.

This volume is a detailed presentation of present day knowledge of tungsten. The authors have discussed the history, geology, ore dressing, metallurgy, chemistry, industrial applications, and economics of tungsten, and tungsten substitutes. Appendices give terms of purchase of tungsten ores, originating in the different producing countries.

Plans Take Shape for '44 Foundry Congress

IT IS now certain, even at this early date, that the 3d War Production Foundry Congress and Foundry Show, to be held at Buffalo, April 25-28, will be a vital aid to foundrymen in war production work. The papers and reports to be presented this year are of high caliber, with a number of new developments in processes, production and metallurgy to be discussed.

Valuable reports on committee activities are expected, including data on the cupola research program, use of cast iron at elevated temperatures, and sand investigational work. Inspection methods, especially non-destructive testing, will be well received, and major developments in centrifugal castings will come up for extensive discussion.

Division of Interest

As will be seen from the accompanying Tentative Program of sessions, effort is being made to conserve visitors' time by concentrating sessions on particular subjects. Thus, Malleable, Aluminum and Magnesium, and Brass and Bronze sessions are scheduled tentatively for the first three days, April 25-27. Likewise, Gray Iron, Steel and Patternmaking Division papers will occupy only the last three days of the Congress. Other sessions of general interest are spread throughout the week.

1944 Program Outline

Tuesday, April 25

A.M.—Registration
Opening Meeting

P.M.—Aluminum and Magnesium
Malleable Practice
Plant and Plant Equipment
Foreman Training
Refractories
Engineering Training
Sand Shop Operation Courses

Wednesday, April 26

A.M.—Brass and Bronze Castings
Malleable Practice
Gray Iron Practice

P.M.—Inspection of Castings
Malleable Practice
Aluminum and Magnesium
Steel Casting Practice
Gray Iron Castings
Sand Research
Apprentice Training
Shop Operation Courses

Thursday, April 27

A.M.—Business Mt., Awards Lecture

P.M.—Brass and Bronze Practice
Steel Castings
Gray Iron Castings Practice
Aluminum and Magnesium
Safety and Hygiene
Sand Research
Job Evaluation and Time Study
Shop Operation Courses

Friday, April 28

A.M.—Steel Casting Practice
Pattern Making
Gray Iron Practice

P.M.—Steel Castings
Centrifugal Casting Practice
Heading and Gating
Shop Operation Courses
A.F.A. Annual Dinner

This method of scheduling sessions, employed successfully at St. Louis in 1943 and at Cleveland in 1942, should conserve greatly the time of men responsible for plant production. Other phases of the program also have been planned to keep men away from production the shortest possible time.

1944 Buffalo Preview

With the approval of the Western New York Chapter, plans are being made for a Buffalo Preview on Monday, April 24, from 6:00 to 10:00 p.m. The successful experience of 1938, 1940 and 1942 indicates that the Preview is one of the most popular and well-attended features of the Foundry Show, with men from many local manufacturing plants and supply companies in attendance.

All Foundry Show exhibits will be open during the Buffalo Preview, giving exhibitors an opportunity to put the "finishing touches" on their displays before the official opening of the Foundry Congress on Tuesday morning. Men of the Western New York Chapter, hosts during the days of the Congress, also will take the opportunity of seeing the exhibits Monday night.

Admission to the Preview, as usual, will be free, on presentation of tickets distributed by A.F.A. and the Western New York Chapter. Invitations will be extended to all

Buffalo, 13th American city—the site of the 3d A.F.A. War Production Congress and Foundry Show.

plants in the vicinity interested in foundry production. Men (and women also) from war plants in the district, who will be unable to attend during the daytime, will make the most of the Preview Monday night.

Successful Exhibit Assured

Manufacturers of equipment and supplies of materials for foundry use are making their exhibit plans to conform with the announced A.F.A. policy of a Foundry Show calculated to be of greatest value in war production of castings. Streamlined exhibits thus will occupy a major part of the exhibit halls, and many new developments in machines and materials will be shown.

In the ranks of exhibitors at Buffalo will be many firms who were unable to be represented at Cleveland in 1942. Also, over a score of companies who have never before exhibited at our A.F.A. Foundry Show will display their products and services in 1944.

The number of exhibitors who have applied for space this year already exceeds the total of exhibitors two years ago. Space nomination blanks, for exhibitors to select choices of location in the exhibit halls, have now been mailed and the assignment of space will soon begin.

Visitors at the Buffalo Foundry Congress will find the Auditorium ideally suited for obtaining the most information with least inconvenience. Meeting rooms and exhibit halls are easily accessible, facilities for meetings being superior to any provided at any previous A.F.A. convention of comparable size.

Hotel Reservations

Hotel Reservation forms have been mailed to all Association members and to exhibitor representatives, and all are urged to make requests for rooms promptly, through the A.F.A. Foundry Congress Housing Bureau, 602 Genesee Bldg., Buffalo. No reservations will be accepted by the hotels that have signed agreements with A.F.A. for the week of April 25-28, unless made through the Housing Bureau.

When most hotel room requests are in, the Housing Bureau will meet between March 1 and 15 and will make definite room assignments, notifying both applicants and hotels of assignments made. Thus all will have equal opportunity for hotel accommodations, which it is felt will be adequate under this system.

To protect Service Men arriving in Buffalo on furlough or on orders without reservations, A.F.A. has instructed the Housing Bureau to withhold 10 per cent of each Buffalo hotel's Foundry Congress commitments. While not all of these rooms may be required for this purpose, the Association believes that men in the Armed Forces should have priority on accommodations at all times.

Steel Founders Educational Campaign

FOUNDRY educational programs are assuming new importance, chiefly because younger men have been given preference to other industries, which have emphasized theoretical knowledge to a greater degree.

With the idea of creating a broader interest in the foundry field, an unusually practical demonstration of foundry methods, from actual blueprints and patterns through each step to the finished casting, was devised recently by members of the Eastern Division of the Steel Founders Society of America and set up, together with a melting furnace in full operation, in the Hall of Prime Movers at the Franklin Institute, Philadelphia.

The lecture and demonstration procedure is handled by J. D. Miller, a former foundryman, who discusses step by step production of castings for college, tradeschool, technical trainee, or apprentice groups who may be contemplating a foundry career. Demonstrations open to the public began January 11 and will continue on a permanent basis for the duration.

Sample castings are poured at relatively low temperatures from a high frequency induction-type furnace, and the various ways of applying gates and risers, as well as proper mold and core handling for steel and iron, are all illustrated by representative castings, both finished and in the rough. Modern tool set-ups for machining iron, steel, and malleable castings are also explained.

The demonstration casts favorable light upon the foundry industry's contribution to the war effort.

The following fifteen firms in the foundry industry contributed the material:

Ajax Engineering Corp., Div. Ajax Metal Co.
American Steel Castings Co.
Atlantic Steel Castings Co.
Birdsboro Steel Foundry & Machine Co.
Crucible Steel Casting Co.
Deemer Steel Casting Co.
Dodge Steel Co.
General Steel Castings Corp.
Hartford Electric Steel Corp.
Lebanon Steel Foundry
Penn Steel Casting Co.
Pennsylvania Electric Steel Castings Co.
Reading Steel Castings Div., American Chain & Cable Co., Inc.
Treadwell Engineering Co.
Vulcan Iron Works.

Philadelphia, Wilmington and Chester representatives of Steel Casters Society of America presenting exhibit to The Franklin Institute. Dr. Henry Butler Allen, director of the Institute (fourth from left) inspecting first casting.

New Association Members

(December 16, 1943 to January 15, 1944)

This list of 103 new Association members over the period December 16, 1943, to January 15, 1944, is ample evidence that the Membership Committees kept up their vigilance over the Yuletide festivities. The total shows a substantial increase over the same period last year, as Rochester, the newest chapter, leads with 25 new members.

BIRMINGHAM CHAPTER

Henry B. Long, Supt., Jefferson Foundry Co., Birmingham, Ala.

CENTRAL INDIANA CHAPTER

Clay Bush, Owner, B. & B. Foundry, Pendleton, Ind.
Thomas E. LaMondy, Foundry Supt., Ertel Machine Co., Indianapolis.
J. P. Lentz, Foundry Met., International Harvester Co., Indianapolis.
Harold H. Lurie, Chief Met., Cummins Engine Co., Columbus, Ind.

CENTRAL NEW YORK CHAPTER

***Ingersoll-Rand Co., Painted Post, N. Y. (R. A. Minnear, Foundry Supt.).**
Wm. R. Jones, Gen. Foundry Foreman, Ingersoll-Rand Co., Painted Post, New York.

CHICAGO CHAPTER

Luther B. Blickenstaff, Foundry Chief Inspector, Dodge-Chicago Plant, Chrysler Corp., Chicago.
Robert Dalton, Met., Armour Research Foundation, Chicago.
George P. Fisher, Foundry Supt., Whiting Corp., Harvey, Ill.
Andrew Hayes, Pattern Shop Foreman, Whiting Corp., Harvey, Ill.
Toby A. Hedges, Molder, Continental Roll & Steel Foundry Co., East Chicago, Ind.
***Independent Pneumatic Tool Co., Chicago (W. A. Nugent, Vice Pres.).**
Roy Barnard McCauley, Jr., Instructor in Charge of X-Ray Lab., Illinois Institute of Technology, Chicago.
Fred J. Poettgen, Chief Inspector, American Steel Foundries, East Chicago, Ind.
Donald M. Rehm, Asst. Expediter, Hydro-Blast Corp., Chicago.
H. Brown Reinhardt, Div. Engr., American Manganese Steel Div., American Brake Shoe & Foundry Co., Chicago Heights, Ill.
Joseph J. Schallerer, Owner, Calumet Pattern Works, Chicago.
C. F. Strom, Supv. Engr., American Steel Foundries, Chicago.
John B. Swift, Foundry Engr., Hydro-Blast Corp., Chicago.
R. J. Young, Supt., Mfg. Div., Chicago Hardware Foundry Co., North Chicago, Ill.

CINCINNATI DISTRICT CHAPTER

Walter Horth, Foundry Engr., Cincinnati Milling Machine Co., Cincinnati.

DETROIT CHAPTER

William Clarence Brown, Foreman, Detroit Steel Casting Co., Detroit.
Duane A. Shepard, Met., Aluminm Co. of America, Detroit.

EASTERN CANADA & NEWFOUNDLAND CHAPTER

Raoul Brunette, Foreman, Robert Mitchell Co., Ltd., Montreal.
Robert Ernest Cameron, Secy.-Treas.-Office Mgr., Webster & Sons, Ltd., Montreal.
Earl Chilvers, Core Room Foreman, Canadian Ingersoll-Rand Co., Ltd., Sherbrooke, Que.
***Lynn MacLeod Metallurgy, Ltd., Thetford Mines, Que. (O. H. Seveigny, Gen. Mgr.).**
O. Malo, Supt., Lynn MacLeod Metallurgy, Ltd., Thetford Mines, Que.
Henry McLarnon, Foundry Foreman, James Robertson Co., Ltd., Montreal.
***McLennan Foundry & Machine Works, Ltd., Campbellton, N. B. (H. M. McLennan, Pres. & Gen. Mgr.).**
Robert C. Moffatt, Scrap Supv., Open Hearth Dept., Canadian Car & Foundry Co., Ltd., Montreal.
A. A. Senecal, Owner, Montreal Cabinet & Pattern Works, Montreal.

NORTHEASTERN OHIO CHAPTER

Walter Blackwood, Melter, Beaver Falls Steel Co., Beaver Falls, Pa.
***Briggs Manufacturing Co., Cleveland (Clarence H. Kuschel, Plant Mgr.).**
Albert C. Hunter, Briggs Manufacturing Co., Cleveland.
Ernest Puschaver, Foreman, National Malleable & Steel Castings Co., Cleveland.
Vaun C. Stocker, Supt., Castings Div., Briggs Manufacturing Co., Cleveland.
Paul J. Toth, Core Foreman, National Malleable & Steel Casting Co., Cleveland.
***Lee Wilson Engineering Co., Inc., Cleveland (Cranston Howe Carpenter, Sales Engr.).**

NORTHERN CALIFORNIA CHAPTER

Nino Billeci, Core Room Foreman, Columbia Steel Co., Pittsburg, Calif.
Leo R. Bonari, Sr. Met., Columbia Steel Co., Pittsburg, Calif.
James Cassidy, Core Room Foreman, General Metals Corp., Oakland, Calif.
Edward Doleman, Gen. Met., Columbia Steel Co., Pittsburg, Calif.
Henry F. Myers, Sr. Met., Columbia Steel Co., Pittsburg, Calif.
W. H. Olson, Shop. Supt., General Metals Corp., Oakland, Calif.
Carl H. Rowsing, Gen. Met., Columbia Steel Co., Pittsburg, Calif.
Walter White, Melter, H. C. Macaulay Foundry Co., Berkeley, Calif.
Thomas W. Williamson, Patternmaker Foreman, Columbia Steel Co., Pittsburg, Calif.

ONTARIO CHAPTER

D. O. Davis, Foundry Mgr., Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Bert H. Duxbury, Supt., Canadian Fanner, Ltd., Hamilton, Ont.

PHILADELPHIA CHAPTER

***The Sharples Corp., Philadelphia (Dr. Foster C. Nix, Dir. of Res.).**

QUAD-CITY CHAPTER

Howard W. Conover, Foreman, Micro Pattern Works, Moline, Ill.
***Hawkeye Steel Products Co., Waterloo, Iowa (M. H. Lorenzen, President).**
***Micro Pattern Works, Moline, Ill. (Lloyd Hester, Owner).**

ROCHESTER CHAPTER

Fred E. Adsit, Pattern Foreman, Ingersoll-Rand Co., Painted Post, N. Y.
Louis O. Bartels, American Laundry Machinery Co., Rochester.
William Converse, American Laundry Machinery Co., Rochester.
Myron DeHollander, Designer, Symington-Gould Corp., Rochester.
C. H. Denny, American Laundry Machinery Co., Rochester.
Lloyd Denny, American Laundry Machinery Co., Rochester.
Charles C. Fairfax, A. P. Green Fire Brick Co., Mexico, Mo.
Frank Favaloro, Foreman, Monroe Foundries, Inc., Rochester.
E. H. Fiesinger, Jr., Foundry Engr., Ingersoll-Rand Co., Painted Post, New York.
Frank E. Gallagher, Asst. Chief Clerk, Symington-Gould Corp., Rochester.
Peter Hahn, Jr., American Laundry Machinery Co., Rochester.
Edward S. Klimaszewski, Draftsman, Symington-Gould Corp., Rochester.
William A. Lind, Draftsman, Symington-Gould Corp., Rochester.
Arthur Lochte, American Laundry Machinery Co., Rochester.
Herbert Mermagen, Supt., Industl. X-Ray Lab., University of Rochester, Rochester.
***Monroe Foundries, Inc., Rochester, N. Y. (August J. D'Hondt, President).**
William Peterson, American Laundry Machinery Co., Rochester.
G. D. Rogers, Chief Clerk, Engrg. Dept., Symington-Gould Corp., Rochester.
Edward C. Seiser, Gen. Foundry Foreman, American Laundry Machinery Co., Rochester.
Arthur B. Tinker, Foundry Supt., Papec Co., Shortsville, N. Y.
Hugh Lester VanZandt, Layout & Designing Draftsman, Symington-Gould Corp., Rochester.
Galin F. Wahl, Draftsman, Symington-Gould Corp., Rochester.
Ernest J. Warnock, Chief Draftsman, Symington-Gould Corp., Rochester.
Donald E. Webster, American Laundry Machinery Co., Rochester.
E. J. White, Symington-Gould Corp., Rochester.

SOUTHERN CALIFORNIA CHAPTER

***Commercial Iron Works, Los Angeles (Claude Welcome, Vice Pres.-Plant Supt.).**
Richard F. Hauser, Tech. Asst., Refinery, Basic Magnesium, Inc., Las Vegas, Nev.
Paul V. Morrow, Met., Commercial Iron Works, Los Angeles.
Henry Raquet, Gray Iron Foreman, Commercial Iron Works, Los Angeles.

TEXAS CHAPTER

Lindsey L. Adams, Foundry Meth. Engr., American Well & Prospecting Co., Corsicana, Texas.
***Barry and Barry, Beaumont, Texas (J. W. Barry, Co-Owner).**
Arthur S. Cramer, Purch. Agt., Dickson Gun Plant, Hughes Tool Co., Houston.
H. F. Elmer, Supt., Dedman Foundry & Machine Co., Houston.
C. C. Graff, Texas Electric Steel Casting Co., Houston.
Albert Ray Hilton, Alloy Foundry Foreman, Hughes Tool Co., Houston.
W. E. Spradley, Foreman, Hughes Tool Co., Houston.

WESTERN MICHIGAN CHAPTER

Victor W. Hain, Salesman, F. B. Stevens, Inc., Detroit.

WESTERN NEW YORK CHAPTER

George J. Pink, Owner, Pink's Pattern Works, Rochester, N. Y.
R. R. Rychener, Repr., National Gypsum Co., Buffalo, N. Y.
Roger E. Walsh, Sales Repr., Hickman, Williams & Co., Pittsburgh, Pa.

WISCONSIN CHAPTER

Carl P. Gergen, Core Room Foreman, Allis-Chalmers Mfg. Co., West Allis, Wis.
Frank Marker, Foreman, Nordberg Mfg. Co., Milwaukee.
***Racine Aluminum & Brass Foundry, Racine, Wis. (A. R. Tooman, Owner).**
Eugene P. Thoma, Prodn. Planning Engr., Kaukauna Machine Corp., Kaukauna, Wis.
Alex Vernel, Core Room Foreman, Racine Aluminum & Brass Foundry, Racine, Wis.
Harry T. Yehle, Molder, Vilter Mfg. Co., Milwaukee.

OUTSIDE OF CHAPTER

C. W. Ferguson, Gen. Mgr., The Durban Falkirk Iron Co., Ltd., Jacobs, Natal, South Africa.
Harry K. McAllister, Pattern Shop Foreman, Western Foundry Co., Portland, Ore.
Frank Miller, Salesman, Western Industrial Supply Co., Portland, Ore.
F. Umerez-Blanco, Chief Engr., Cerveceria de Caracas, Caracas, Venezuela, S. A.

*Company Members

Wisconsin Holds 7th Regional Conference

WAR and postwar industrial topics will be featured at the 7th Annual Regional Foundry Conference, sponsored jointly by the A.F.A. Wisconsin Chapter and the University of Wisconsin, February 10-11, at the Schroeder Hotel, Milwaukee.

Harry E. Ladwig, Chairman, and W. A. Hambley, Co-Chairman, both of Allis-Chalmers Mfg. Co., have arranged 25 technical sessions where foundrymen, engineers and management can discuss mutual problems, exchange ideas, and plan for better methods, all prompted by the idea of creating quality products.

In addition to the technical program, there will be three addresses of general interest, by outstanding men in their respective fields. F. Ellis Johnson, Dean, College of Engineering, University of Wisconsin, will speak at the Thursday luncheon. His subject will be "University's Function in Training Men for Industry." President C. A. Dykstra, University of Wisconsin, will discuss "In Time of War" at the annual banquet. The Friday luncheon speaker will be J. H. Van DeVenter, President and Editor of *The Iron Age*.

A complete program of the conference appears on this page.

Sand Executive Committee Meets

THE Executive Committee of the Foundry Sand Research Project met at the Hotel Statler, Cleveland, Ohio, January 10, with Dr. H. Ries, Technical Director, Ithaca, N. Y., presiding. Practically 100 per cent attendance of members of this Committee made the meeting an exceptionally fruitful one.

The committee received and approved reports of the Subcommittees on Grading and Fineness, Flowability, Physical Properties of Steel Foundry Sands at Elevated Temperatures, Sintering Test, Core Test, Light Metals, and Nomenclature.

The committee set-up of the Foundry Sand Research Project was revised, the name of the committees doing the work on foundry sand testing being changed from Foundry Sand Research Committee to Foundry Sand Research Project, and the present subcommittees being raised to a committee status. An increase in scope of the activities of the Committee on Physical Properties of Foundry Sands at Elevated Temperatures was

Schedule of Sessions -- Wisconsin Regional Confernece Hotel Schroeder, Milwaukee, February 10 and 11

Thursday, February 10

9:00 a. m.—REGISTRATION, HOTEL SCHROEDER

10:30 a. m.—MOVIES

11:00 a. m.-12:00 noon—SPECIAL TALKS BY GOVERNMENT WAR AGENCIES

12:00 a. m.—LUNCHEON MEETING
Speaker, F. Ellis Johnson, Dean, College of Engineering, U. of W.
"University's Function in Training Men for Industry"

2:00 p. m.-3:30 p. m.—GRAY IRON
Speaker, H. K. Sohner, International Harvester Co.
"Problems of Present Day Melting"

2:00 p. m.-3:30 p. m.—STEEL
Speaker, Dr. George Moore, Battelle Memorial Institute
"Hydrogen in Steel Castings"

2:00 p. m.-3:30 p. m.—MALLEABLE
Speaker, C. H. Lorig, Battelle Memorial Institute
"Post War Annealing"

2:00 p. m.-3:30 p. m.—NON-FERROUS
"Manufacture and Inspection of Aircraft Castings"

2:00 p. m.-3:30 p. m.—PATTERNS
"Proper Relationship Between Pattern Shop and Foundry"

2:00 p. m.-3:30 p. m.—MANAGEMENT AND ENGINEERING
"Symposium on Centrifugal Casting of Metals"

3:40 p. m.-5:10 p. m.—GRAY IRON
Speaker, Prof. M. O. Withey, College of Engineering, U. of W.
"Significance and Importance of Physical Testing and Interpretation of the Results"

3:40 p. m.-5:10 p. m.—STEEL
"Sand Problems"

3:40 p. m.-5:10 p. m.—MALLEABLE

3:40 p. m.-5:10 p. m.—NON-FERROUS
"Manufacture and Inspection of Aircraft Castings"

3:40 p. m.-5:10 p. m.—PATTERNS
"Proper Relationship Between Pattern Shop and Foundry"

3:40 p. m.-5:10 p. m.—MANAGEMENT AND ENGINEERING
Speaker, John H. Baker, Baker Manufacturing Co.
"Vibration Mechanics of a Combustion Engine"

5:10 p. m.-6:30 p. m.—MOVIES

6:30 p. m.—BANQUET
Speaker, President C. A. Dykstra, U. of W.
"In Time of War"

Friday, February 11

10:00 a. m.-11:50 a. m.—GRAY IRON
"Scrap Clinic"
"Scrap Clinic"
Conducted by
A. S. KLOPF—*Hansell-Elcock Co.*
C. ZAHN—*Vilter Mfg. Co.*
E. J. CARMODY—*Chas. Kawin Co.*
W. A. HAMBLEY—*Allis Chalmers Mfg. Co.*

10:00 a. m.-11:50 a. m.—STEEL
Speaker, L. A. Danse, General Motors Corp.
"Buyers View-Point on Steel Castings"

10:00 a. m.-11:50 a. m.—MALLEABLE
Speaker Prof. F. R. Schneidewind, University of Michigan
"Stabilization of Annealing"

10:00 a. m.-11:50 a. m.—NON-FERROUS
"Gates and Risers and Scrap Clinic"

10:00 a. m.-11:50 a. m.—PATTERNS

10:00 a. m.-11:50 a. m.—MANAGEMENT AND ENGINEERING
Speaker, H. F. Kincaid, International Harvester Co.
"Practical Applications of the Spectrograph"

12:00 noon—LUNCHEON
J. H. Van Deventer, *"The Iron Age"*

2:00 p. m.-3:30 p. m.—GRAY IRON
Speaker, K. R. Geist, Allis Chalmers Mfg. Co.
"Effects of Section on Physical Properties"

2:00 p. m.-3:30 p. m.—STEEL
"Gates and Risers

2:00 p. m.-3:30 p. m.—MALLEABLE
Speaker, C. A. Braeshares, Harbison-Walker Co.
"Refractories in Malleable Furnaces"

2:00 p. m.-3:30 p. m.—NON-FERROUS
"Round Table Discussion on Sands"

2:00 p. m.-3:30 p. m.—PATTERNS
"Apprentices in Pattern Making"

2:00 p. m.-3:30 p. m.—MANAGEMENT AND ENGINEERING
"Non-Destructive Testing"

3:40 p. m.-5:10 p. m.—GENERAL SESSION
Speaker, M. J. Gregory, Caterpillar Tractor Co. with an exhibit on cores and blowing equipment.
"Core Blowing"

approved. The reorganization will consist of a Steering Committee, and subcommittees to be appointed for the study of steel, iron and non-ferrous foundry sands at elevated temperatures.

The present membership of the Subcommittee for the Study of Physical Properties of Steel Foundry Sands at Elevated Temperatures is to be retained, and no change made in the program at present being directed by this Subcommittee and being conducted jointly by Cornell University and the Naval Research Laboratory. The new subcommittees on iron and non-ferrous sands are to formulate their own programs, which will be subject to the suggestion and approval of the Steering Committee.

The Committee also discussed the publication of a new edition of the present book, *"Testing and Grading Foundry Sands and Clays."* It was voted to include only standard and tentative standard tests in this publication, and certain measures were taken for revision of the sequence of contents of the book.

Dr. Ries announced the formation of a committee to study the deformation of foundry sands, and requested that anyone using this test, or interested in developing standard procedure, should contact him in order to make the study as complete as possible.

The sintering test, proposed as a tentative standard by the Subcommittee on Sintering Test, was approved.

During the past year, resignations have been received from C. P. Randall, Eastern Clay Products, Inc., Wollaston, Mass., and C. V. Nass, Pettibone Mulliken Corp., Chicago, Ill. F. S. Brewster, Dow Chemical Co., Bay City, Mich., chairman of the Light Metals Committee, was chosen to succeed Mr. Nass. The secretary was instructed to write letters to Messrs. Randall and Nass, thanking them for their services to the Committee and to the industry.

Chill Test Committee Meets in Cleveland

THE Gray Iron Division Chill Test Committee met at Hotel Cleveland, January 12, under the chairmanship of T. E. Barlow, Vanadium Corp of America, Detroit. This Committee recently was organized for the purpose of studying chill tests used for control purposes in gray iron foundries. The Committee hopes, through its studies, to be able to establish a standard chill for gray iron foundries, so that information gleaned from this production control test for cast iron may be more readily interpreted and correlated among the various plants which are cooperating in the undertaking.

At the Cleveland meeting of the Committee, decision was reached on four general types of chill test specimens to be investigated. Each of five plants will cast all four chill test specimens in both green and dry sand molds, and will accumulate data on such points as effect of pouring temperature, type of mold, type of test, physical properties of the base iron, etc.

The Committee will undertake to do this work prior to the sessions of the Third War Production Foundry Congress, to be held in Buffalo, April 25-28, inclusive, and will discuss their findings at two sessions of the Gray Iron Shop Operation Course. To complete the entire project, namely, the evolution of a standard chill test, it is expected that several years of constant effort will be required.

Membership of the Gray Iron Division Chill Test Committee is as follows:

T. E. Barlow, Vanadium Corp. of America, Detroit, Mich., *Chairman.*

K. Geist, Allis-Chalmers Mfg. Co., Milwaukee, Wis., *Secretary.*

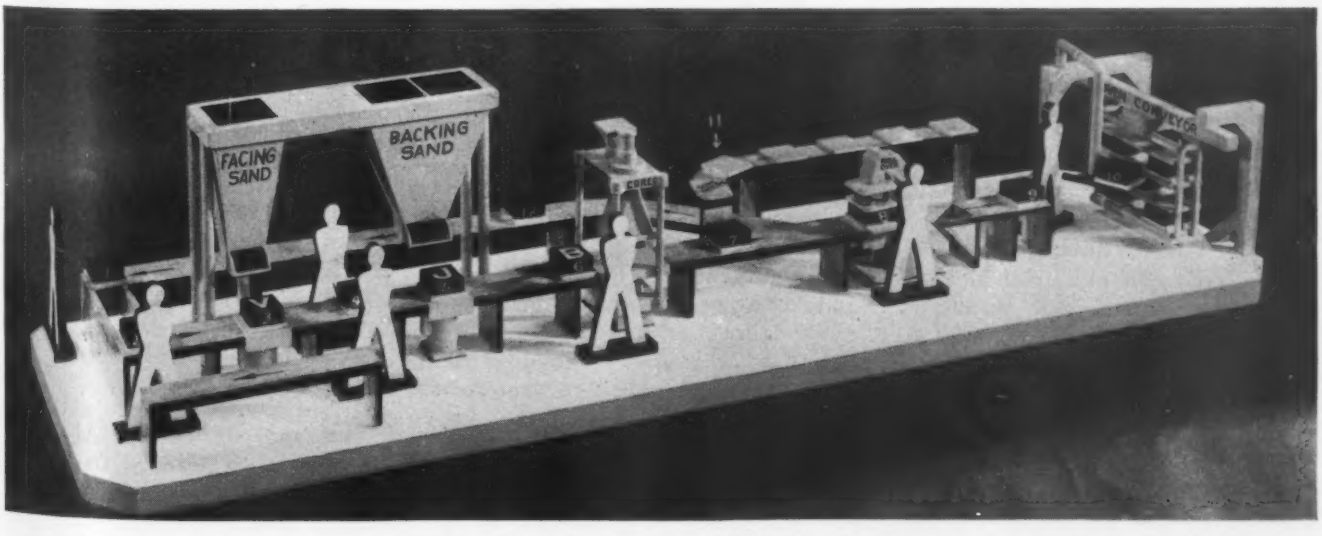
T. E. Eagan, Cooper-Bessemer Corp., Grove City, Pa.

D. E. Krause, Battelle Memorial Institute, Columbus, Ohio.

D. E. Lehane, Jr., Westinghouse Electric & Mfg. Co., Trafford, Pa.

W. B. McFerrin, Cadillac Motor Co., Detroit, Mich.

H. C. Winte, Worthington Pump & Machinery Co., Buffalo, N. Y.



How Caterpillar Tractor Co., Peoria, Ill., utilizes models to show method of production and labor necessary in making cores for aluminum cylinder head castings. The foundry using this layout designed by Factory Manager M. J. Gregory, National Director of A.F.A., employs 85 per cent women, represented by the small figures. Due to conveyorizing and other material handling aids, the amount of lifting has been reduced to a minimum. Numbers on the square blocks at various stations indicate the various coremaking operations: (1) cleaning and washing pattern; (2) inserting nails at pattern joint; (3) vibrating sand into fins; (4) adding additional nails; (5) jolting backing sand over pattern; (6) core entering blower for completion; (7) placing drier on top of finished core; (8) core in process of rolling over; (9) core completed; (10) placing core on conveyor of continuous core oven; (11) driers returning from oven; (12) pattern return to station No. 1.

Association Loses A Valuable Member

Prof. Jos. E. Oesterle

PROF. JOS. E. OESTERLE, a member of the department of Mining and Metallurgy at the University of Wisconsin died December 17, 1943, at the age of 55 years. Prof. Oesterle represented the University in A.F.A., and his fine support is a definite loss to the Association.

A tireless worker and an active member of the Wisconsin Chapter, Prof. Oesterle was always interested in improved foundry practice. He did much to create foundry careers among students who manifested an aptitude for this type of work, and his constructive planning contributed immeasurably to the success of the Regional Conferences sponsored by the Wisconsin Chapter of the American Foundrymen's Association.

Pamphlet to be Issued on Costs of Castings

REPRESENTATIVES of the several foundry trade associations, cooperating through the A.F.A. Cost Committee have issued a revision of the material first published in 1931 as "Recommendations to Buyers of Castings," compiling this material as data required for intelligent estimation of castings costs.

The subcommittee sponsoring the revisions was under the chairmanship of C. A. Davis, Caterpillar Tractor Company, Peoria, Ill. Other committee members included:

E. W. Horlebein, Gibson & Kirk Co., Baltimore, Md., representing Non-Ferrous Founders' Society.
John L. Carter, Newark, N. J., representing Gray Iron Founders' Society.
C. S. Roberts, Dodge Steel Co., Philadelphia, representing Steel Founders' Society of America.
John A. Wagner, Wagner Malleable Iron Co., Decatur, Illinois, representing Malleable Founders' Society.

The personnel of the A.F.A. Cost Committee, approving the recommendations, has in addition to the above mentioned members the following:

R. L. Lee (Chairman, A.F.A. Cost Committee) Grede Foundries, Inc., Milwaukee.
Robert E. Belt, Malleable Founders' Society, Cleveland.
R. L. Collier, Steel Founders' Society of America, Cleveland.

The revision of the "Recommendations to Buyers of Castings," published in full in the January issue of American Foundryman, is to be issued in pamphlet form for foundrymen to distribute to their customers.

The original recommendations were developed, as the committee realized the need for published material which would emphasize the specific data which any foundryman should have when estimating costs of castings from blueprints. Following the issuing of the recommendations in 1931, they were submitted to the National Association of Purchasing Agents and, with slight revisions, were approved by that organization. Since then, they have been widely used throughout the industry.

The A.F.A. Cost Committee is one of the oldest of the standing committees of the Association, having been first organized in 1898. Over the years it has issued many papers on the need for every foundryman to know the cost of the castings he sells.

In its earlier history the committee developed and published foundry cost systems. Later, since the trade associations have issued standard systems for their respective branches, the A.F.A. Committee has studied and recommended the different uses of these systems. It is now sponsoring sessions at the Annual A.F.A. Congresses for the discussion of problems common to all branches in their cost finding methods.

"Bill Twins" Celebrate 25th Anniversary

Pat Dwyer

Harry L. Richey

THIS month's issue of *The Foundry* will mark the 25th milestone of a unique editorial combination. It was just 25 years ago that *The Foundry* published the first of its articles entitled "The Adventures of Bill," written by Pat Dwyer, engineering editor, and illustrated by Harry L. Richey, at that time a member of the Art Department staff of *The Foundry*. It is of interest to note that this team has been responsible for the publication of 456 "Bill" stories, which during the 25-year period have become known to foundrymen all over the world.

Pat is well known to the foundry industry. His work, together with his service on various Association committees, lead to his election as a life member of the Association in 1941.

Mr. Richey, although less well known to foundrymen, is an important part of the team, for his inimitable illustrations have given many a foundryman anything from a chuckle to a good belly laugh.

We offer our congratulations to the "Bill" team and hope that their collaboration may continue for many years to come, for the enjoyment and instruction of foundrymen.

CHAPTER OFFICERS

E. N. Delahunt
Warden King, Ltd.
Montreal
Chairman
Eastern Canada and Newfoundland Chapter

A. H. Trapp
Minneapolis-Moline Power Implement Co.
Minneapolis
Director
Twin City Chapter

E. J. Bair, Sr.
Utica Radiator Corp.
Utica, N. Y.
Director
Central New York Chapter

W. C. Schulte
Curtiss Propeller Div.,
Curtiss Wright Corp.
Caldwell, N. J.
Director
Metropolitan Chapter

A. S. Holberg
Alabama Clay Products Co.
Birmingham
Director
Birmingham Chapter

F. Ray Fleig
Smith Facing & Supply Co.
Cleveland
Treasurer
Northeastern Ohio Chapter

J. W. Greenstreet
Maryland Car Wheel Co.
Baltimore, Md.
Director
Chesapeake Chapter

J. C. Gore
Werner G. Smith Co.
Chicago
Director
Chicago Chapter

Wm. W. Beiser
Reliance Foundry Co.
Cincinnati
Director
Cincinnati Chapter

H. B. Harvey
Indiana Foundry Corp.
Muncie, Ind.
Director
Central Indiana Chapter

Wm. F. Lange
Casting Service Corp.
LaPorte, Ind.
Director
Michiana Chapter

V. A. Crosby
Climax Molybdenum Co.
Detroit
Director
Detroit Chapter

CHAPTER ACTIVITIES

News

See page 25 for list of Chapter representatives whose reports of local activities appear in this issue.

Birmingham Officially Begins Season

By H. B. McLaurine

THE 1943-44 season opened a bit late for the Birmingham chapter, but the first session was one that set a fine pace for ensuing meetings.

Under the guidance of Abe S. Holberg, Alabama Clay Products Co., Birmingham, who served as host at the opening dinner, December 17, at the Tutwiler Hotel, the gathering heard Warren Whitney, National Cast Iron Pipe Div., J. B. Clow & Sons, Birmingham, compare the progress of the foundry industry in his talk entitled "The Foundry Industry, Present and Postwar." Mr. Whitney pointed out that one result of the war effort is the creation of a faith and confidence in the foundrymen, in their ability to successfully perform any task assigned to them. This ability to coordinate effort for war production work will enable the industry to stand on the threshold of civilian production with full confidence in its ability to meet the demands of the postwar period.

Recognition was accorded Dr. J. T. McKenzie, American Cast Iron Pipe Co., Birmingham, and L. N. Shannon, Stockham Pipe Fittings Co., Birmingham, as the only life members of A.F.A. living in the South.

The program was arranged by R. A. Donaldson, Woodward Iron Co., Birmingham, chairman of the Chapter Program Committee.

Some personalities at the November 12 meeting of Central New York Chapter. Top left, J. S. Vanick, International Nickel Co., guest speaker. Top right (left to right)—Mrs. Kathryn Bryant Hartmann, George W. Bryant Core Sands, McConnellsville, N. Y.; Lloyd D. Wright, U. S. Radiator Corp., Geneva, N. Y.; (rear, facing) S. C. Smith, Kennedy Valve Mfg. Co., Elmira, N. Y. Below, Chapter officers and directors: (seated, left to right) Director M. G. Hollenbeck, Kennedy Valve Mfg. Co., Elmira; Vice-Chairman L. E. Hall, Syracuse Chilled Plow Co. Inc., Syracuse, N. Y.; Chairman N. H. Boardman, Elmira Foundry Co. Inc., Elmira; Treasurer E. E. Hook, Dayton Oil Co., Syracuse; H. S. Gulick, New York Air Brake Co., Watertown, N. Y.; (standing, left to right) Director J. R. Moynihan, Cornell University, Ithaca, N. Y.; Director Lloyd D. Wright; Secretary E. G. White, Crouse-Hinds Co., Syracuse; Director I. F. Vergamini, Goulds Pumps Inc., Seneca Falls, N. Y.; Director Wm. D. Dunn, Oberdorfer Foundries Inc., Syracuse; Director R. A. Minnear, Ingersoll-Rand Co., Painted Post, N. Y.

Leighton Long Speaks To Central Indiana

By Robert Langsenkamp

WHEN Vice Chairman H. H. Lurie, Cummings Engine Co., called the January 3rd meeting to order in the Athenaeum, Indianapolis, members and guests of the Central Indiana Chapter heard Leighton Long, Assistant Research Supervisor, Battelle Memorial Institute, speak on "Melting Brass and Bronze in the Cupola."

Mr. Long spoke of cupola operations for brass and bronze as compared to iron, pointing out the importance of using high-carbon coke because of its low slag forming qualities as well as for its low sulphur content.

Round Tables Feature Meeting of Wisconsin

By D. W. Thiem

THE Wisconsin Chapter of A.F.A. held its regular monthly meeting November 12 at Hotel Schroeder, Milwaukee, with excellent representation from all foundry branches. Chapter President Geo. K. Dreher, Ampco Metal Inc., presided and gave a brief talk on the importance of saving man-hours in cleaning castings.

Edw. A. Janke, Nordberg Mfg. Co., presiding at the discussion

group on sand, introduced F. L. Overstreet, Illinois Clay Products Co., who covered "Sand As It Affects Casting Surfaces" most effectively. F. W. LaCroix, District Manager of Scrap Section, W.P.B., discussed the scrap situation in Wisconsin, and recommended using briquet borings and other low type scrap in foundry operations.

Chairman of the malleable iron division, Steve Pohl, Federal Malleable Co., presented W. R. Jaeschke, Whiting Corp., who presented some interesting data on "Melting of Malleable Iron." At the steel session, under leadership of Chas. Fuerst, Falk Corp., the manning table and its application in the foundry was discussed by Robt. C. Behn, Acting Chief, Div. of Labor Utilization, War Manpower Commission.

Harry Bremer, H. E. Bremer Mfg. Co., acted as chairman of the non-ferrous round-table meeting, at which the principal talk was given by A. T. Ruppe, Bendix Products Corp., South Bend, Ind., on "Aluminum Shop Practice and the Use of X-Ray Inspection in Non-Ferrous Control."

Quad City-A.S.M. Groups Hold Joint Meeting

By H. L. Creps

THE Quad City Chapter and the American Society of Metals held their annual joint meeting at Hotel Fort Armstrong, Rock Island, on January 17. Approximately 110 members and guests were present.

A half hour musical program followed the dinner.

Featured speaker was V. A. Crosby, Climax Molybdenum Co., Detroit. In developing his topic, "Factors Affecting Properties of Cast Iron," Mr. Crosby stressed the constitutional makeup of the material, the importance of raw materials and the effect of thermal treatment on the liquid metal.

It was the speaker's opinion that present-day ideas on high test and high strength irons soon will have to be revised to establish a minimum of 45,000 lb. tensile for this classification. The graphite pattern and alloying elements were discussed, and the necessity of proper polishing technique was stressed.

W. E. Jones, Chairman of the Quad City Chapter, presided during the meeting with H. Bornstein, Deere & Co., Moline, Ill., acting as technical officer throughout the discussion period.

Metropolitan Aids Conference

THE Metropolitan Chapter, through participation in the War Production Conference sponsored by the Engineering Societies Committee on war production in the Metropolitan New York area, January 14 at the Commodore Hotel, has cast favorable light on the foundry industry's contribution to the war effort.

The program was inaugurated at the request of the WPB for the interchange of practical ideas and the discussion of common problems relating to various phases of war production work.

According to J. S. Vanick, International Nickel Co., New York, the conference was an outstanding success, with an attendance of over 1,400 at the dinner.

Two panels were devoted to foundry practice, one an afternoon session and the other an evening meeting. Panel No. 1 was guided by A. McIntosh, Wright Aeronautical Corp., Paterson, N. J., Chairman, and W. E. Paulson, Thos. Paulson & Son, Inc., Brooklyn, Vice-Chairman. The program included the following:

"The Design and Application of Light Metal Alloy Castings," by R. E. Ward, Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.

"The Foundry Production of Light Metal Alloys," A. Cristello, Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.

"Brass Foundry Production in Wartime," R. T. Covington, American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.

J. S. Vanick served as Chairman of the No. 2 Panel, with J. W. Reid, R. Hoe & Co., Dunellen, N. J., the Vice-Chairman. The following subjects were discussed:

"The Centrifugal Casting of Non-Ferrous Metals," I. E. Cox, National Bearing Metals Corp., St. Louis.

"Centrifugal Casting of Ferrous Metals," S. D. Moxley, American Cast Iron Pipe Co., Birmingham, Ala.

"Production and Properties of Gray Cast Iron," G. L. Richter, Farrel-Birmingham Co., Ansonia, Conn.

Participation of foundrymen in programs of this kind brings into prominence the industry as a whole, creating a kinship with other engineering trades.

Discuss Cooperation At Western Michigan

B. C. H. Cousineau

WESTERN Michigan wanted to hear something different from a strictly technical talk, and Fred A. Melmoth, Detroit Steel Castings Co., Detroit, made this possible by selecting "Cooperation and the Human Equation in Foundries" as his subject for the talk at the January 10 meeting, at Hotel Ferry, Grand Haven.

". . . and a good time was had by all." Trite, but appropriate, is this comment on the Wisconsin Chapter's Christmas party, held December 10 at the Schroeder Hotel, Milwaukee.

(Photos courtesy John Bing, A. P. Green Fire Brick Co.)

Mr. Melmoth said that to further production in many foundries, closer cooperation between men in supervisory capacities is necessary. He believes that closer cooperation among supervisors might help to ease the feeling between management and labor. He said that an important advance toward improving quality and production is improved relations within the entire organization, from the management down to the worker at the most menial foundry task.

Round Table Meetings Popular at Chicago

By Dean Van Order

THE Chicago group inaugurated the New Year with another interesting evening of round table sessions, held at the Chicago Bar Association Restaurant. Chapter President M. F. Becker, Whiting Corp., presided, introducing the chairmen and discussion leaders for the different meetings.

L. H. Hahn, Sivyer Steel Castings Co., directed the steel session, assisted by Clyde Wyman, Burnside Steel Foundry Co., the discussion leader. In considering "Substitute Materials," various NE steels, their carburizing and decarburizing mediums and intensifiers for hardenability, were discussed.

"Uses and Abuses of Non-Ferrous Foundry Sands" was the topic discussed by the non-ferrous division. Chester Faunt, Christenson & Olson Foundry Co., served as chairman with W. B. George, R. Lavin & Sons Co., acting as discussion leader.

The third meeting was a combination of the gray iron and pattern making division, under the chairmanship of J. T. Leisk, Chicago Hardware Foundry Co.

Cincinnati Hear Talk On Molding Methods

By Martin Milligan

ONE hundred members of the Cincinnati Chapter and their guests gathered at the Cincinnati Club, January 10, to hear Fred G. Sefing, International Nickel Co., New York, discuss "A Study of Molding Methods for Sound Castings."

Defective castings are a double loss, said Mr. Sefing, loss of the casting and loss of the machining time and labor. In the present emergency, he explained, and in the post-war era of intense competition, it will be considered a necessity for foundrymen to produce sound castings.

The speaker summarized six factors which affect the production of all castings:

1. Clean metal.
2. Controlled directional solidification.
3. Risers that feed castings.
4. Use of chills with precautions.
5. Adequate venting.
6. Carefully kept records.

Each of the above points was discussed in detail, illustrated with lantern slides, and reviewed in the discussion period.

Metropolitan Chapter Hears B. A. Miller

By H. C. Seidel

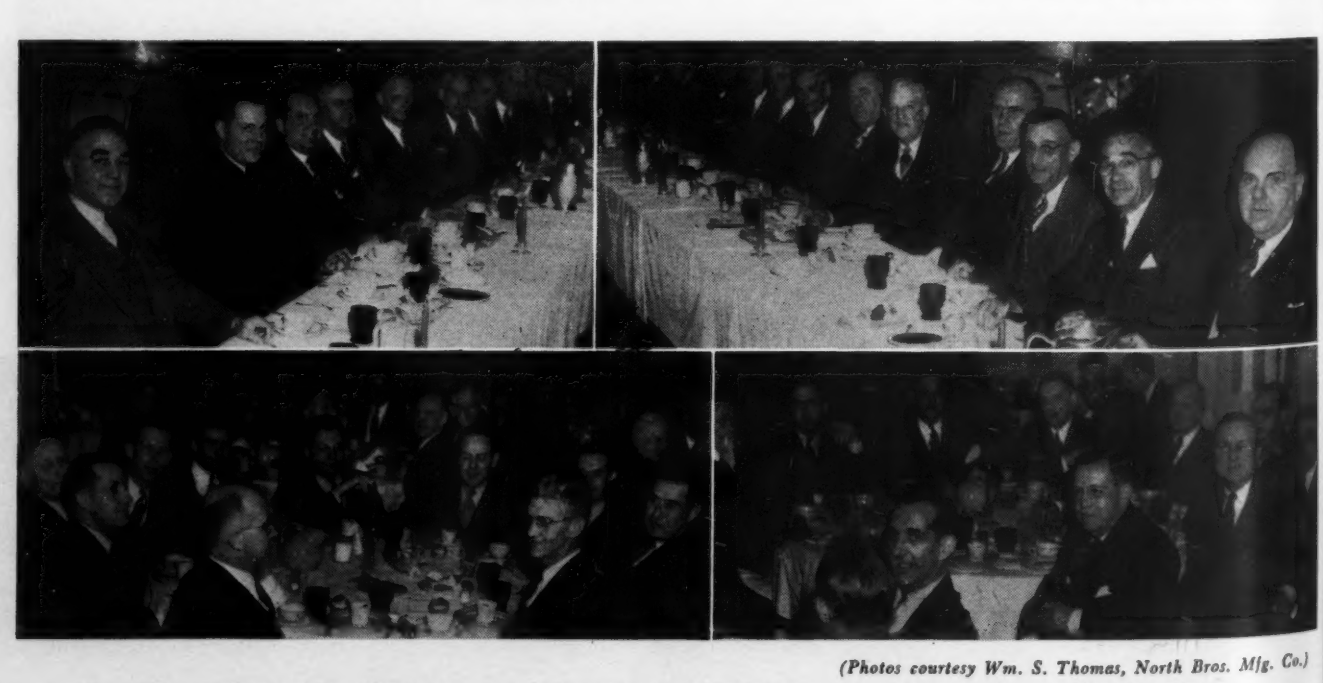
INCLEMENT weather failed to dampen the enthusiasm of the Metropolitan Chapter members when they turned out for the January 3rd meeting, held at the Essex House, Newark, N. J., at which B. A. Miller, Chief Metallurgist for the Cramp Brass and Iron Foundry Div., Baldwin Locomotive Works, Eddystone, Pa., spoke on "Copper Base Alloys." Illustrating his talk with lantern slides, Mr. Miller gave special emphasis to several phases of his subject, which provoked a lively interchange of questions and answers in the ensuing discussion period.

Chapter Chairman J. W. Reid, R. Hoe & Co., Dunellen, N. J., presided at the session, assisted by Sam Tour, Sam Tour & Co., acting as Technical Chairman.

An Appropriate Message, Worthy of Consideration

IN SENDING a monthly meeting notice and 1944 greeting message to members of the Eastern Canada and Newfoundland Chapter, Chairman E. N. Delahunt, Warden King, Ltd., Montreal, wrote:

"Shortly after the Battle of Britain, Winston Churchill, in praising those heroic lads of the R.A.F. made the memorable statement: 'Never in history have so many owed so much to so few.' It is well known to all of us why the life of Britain depended on so few



(Photos courtesy Wm. S. Thomas, North Bros. Mfg. Co.)

The popularity of the Philadelphia Chapter's December 21 Christmas party at the Stephen Girard Hotel, Philadelphia, proved such an attraction that an additional 75 tickets had to be added to the original issue of 350.

and, with this in mind, the idea comes to me as we progress past the halfway mark of our general year's activities that we all should give some thought on preparedness for next year to avoid the possibility of the success of our Chapter depending on so few.

"Many of our members will be asked toward the end of the season to serve the Chapter in some capacity; members of the executive, committee, members, etc. Please be prepared to accept these responsibilities with a determination to put forth your best effort in the hope that we can put Mr. Churchill's statement in reverse and say the life of our Chapter depends on many.

"Your activity on any of the Committees, besides being of great value to the Chapter is also an assurance that you will get full value for your membership and wherever possible we should all take advantage of this opportunity."

This seems to be a very appropriate message, and one that other A.F.A. chapters and members might wish to consider, which is why it is reproduced in this "Chapter Activities" section.

Northeastern Ohio Holds Annual Christmas Party

By Edwin Bremer

ON DECEMBER 16 the Northeastern Ohio Chapter held its annual Christmas party at Hotel Carter, Cleveland. As in previous years, attendance was limited to the seating capacity of the Rainbow room, or 1,000. Following the dinner, the members and their guests saw a two-hour floor show arranged under the direction of L. P. Robinson, chairman of the entertainment committee.

Philadelphia Program Features Two Speakers

By Wm. S. Thomas

APPROXIMATELY 100 members and guests attended the December 10 meeting of the Philadelphia Chapter, held at the Engineers Club, which featured two interesting talks.

The first speaker was the Rev. Clarence Rahn of Temple, Pa., a leading Pennsylvania Dutch Minister, who travels 30,000 miles yearly in connection with the business of the four churches in his district. Rev. Rahn gave an educational and humorous talk, based on the customs of the Pennsylvania Dutch settlements in and around Berks County.

The technical speaker of the evening was J. E. Crown, Superintendent of Steel and Non-Ferrous Foundries, U. S. Naval Gun Factory, and a National Director of A.F.A. Mr. Crown's subject dealt with cleaning, using high-pressure water and sand as an abrasive. He explained that the steel division of the government gun factory has one of the most elaborate systems for this type of cleaning process, and that foundry officials are enthused with the results obtained from the equipment after two years of regular operation.

(Photos courtesy Clyde Thomas, Whiting Corp.)

Round-table meetings, always popular with the Chicago Chapter, brought a large gathering to the Chicago Bar Association Restaurant, January 3. Needless to say, the girl accordion player proved an added attraction.

Organization Meeting at Rochester

By D. E. Webster

THE first official, or organization, meeting of the A.F.A. Rochester Chapter, held at the University of Rochester, January 6, brought together 100 foundrymen and foundry suppliers in the Rochester vicinity.

Henry Hanley, American Laundry Machine Co., Rochester, presided. Ernest Van Billiard, Progressive Foundry Works, Inc., Rochester, appointed Chairman of the Nominating Committee, presented the slate of approved names for officers and directors of the Chapter. A motion was made, seconded and carried that the Secretary cast one ballot for the unanimous election of the slate as presented. This consisted of the following men, all associated with firms located in Rochester:

President—H. B. Hanley.
Vice-President—Chas. E. Vaughn, Ritter Co., Inc.
Secretary-Treasurer—D. E. Webster, American Laundry Machinery Co.

DIRECTORS

L. E. Gleason, Gleason Works.
E. N. Van Billiard
Herman Hetzler, Hetzler Foundries, Inc.
J. E. McHenry, Gleason Works
I. B. Rosenthal, Rochester Smelting & Refining Co.
W. F. Morton, Josiah Anstice & Co., Inc.
M. T. Ganzuage, General Railway Signal Co.
W. G. Brayer, Bausch & Lomb Optical Co.
I. A. Billiar, Symington-Gould Corp.
Fred Sefing, International Nickel

Co., New York, acting on behalf of A.F.A. presented the familiar "baby rattle gavel" to the new president, to be retained by the "infant" chapter until such time as another member is added to the A.F.A. family.

Mr. Sefing then gave the technical address of the evening, "A Study of Molding Methods for Sound Castings," and showed lantern slides.

Twin City Favors Technical Meetings

By Alexis Caswell

IN REPORTING the November and December meetings of the Twin City Chapter, it is interesting to note that the technical meeting "outpulled" the strictly social gathering, according to official attendance records.

"Casting Design" was the subject of the November 22 meeting, held at the Midway Club, St. Paul, when two members of the faculty from the University of Minnesota, J. J. Ryan, Professor of Machinery and Design, and H. F. Scobie, Instructor of Foundry Practice, addressed 97 members and guests.

The social meeting held at the Covered Wagon, Minneapolis, on December 20th, attracted 76 members and guests.

C. H. Anderson, Crown Iron Works Co., Minneapolis, Chapter Chairman, presided at both occasions.

Reports Show Progress of Foundry Students

SOME time ago, the staff of *American Foundryman* contacted Herbert F. Scobie, Instructor in Foundry Practice, University of Minnesota, Minneapolis, sponsor of the A.F.A. Student Chapter at that institution, asking him if he had any record of chapter alumni activities and whether or not many had entered the foundry industry. Mr. Scobie, after some research, has supplied the names of the student alumni and their activities.

This information shows definitely that the foundry industry should encourage student interest in foundry practice, and should endeavor to give assistance to institutions, both trade and collegiate, to stimulate study of foundry practice on a proper basis. The courses in foundry practice given at the University of Minnesota are well known through papers and articles written by Mr. Scobie and Fulton Holtby which have appeared in the *Transactions* and other A.F.A. publications.

(A. P. Green Fire Brick Co.)

Northern Illinois - Southern Wisconsin Christmas party committee: "Gilly" Landstrom, "Ronnie" Mattison, O. W. Josephson, "Cam" Gore and Lyle Manley.

Of the 29 student alumni that Mr. Scobie was able to find in his search, 10 are at present employed in industry, 12 are known to be in the armed forces of the United States, and the addresses and activities of seven are unknown. Of the 10 former students in industry, five are definitely known to be active in the foundry industry.

It is also interesting to note that these men are not all employed in the immediate vicinity of Minneapolis. J. H. Anderson is metallurgist, Diamond Iron Works, Minneapolis; L. J. T. Brom, a technical department head, Aluminum Co. of America, Cleveland; L. R. Kelman, metallurgical engineer, Caterpillar Tractor Co., Peoria, Ill.; Arnold Satz, metallurgist, National Radiator Co., Newcastle, Pa.; Stanley Tingquist, is employed by Westinghouse Electric and Mfg. Co., Pittsburgh; Donald Johnson, head x-ray technician, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.; Eugene Blair is with the Northern Ordnance Co., Minneapolis; and G. A. Harstad with the Chicago-Milwaukee-St. Paul & Pacific Railroad Co., as chemist in the test department. Two alumni, namely, C. W. Magnuson and H. M. Tomasko, are employed outside the industry.

It is also interesting to note that at least one of the student alumnus now in the armed forces formerly was actively employed in the foundry industry, namely, J. A. Havnen, who formerly was associated with

(Photos courtesy John Bing, A. P. Green Fire Brick Co.)

Some of the "old standbys" of the Wisconsin Chapter enjoying themselves at the December 10 Christmas party.

Reporters on Chapter Activities

Officers and representatives of A.F.A. chapter and other foundry groups who report on local activities in this issue, are identified below:

Birmingham—H. B. McLaurine, Birmingham, Ala.

Central Indiana—Robt. Langsenkamp, Langsenkamp-Wheeler Brass Works, Inc., Indianapolis; Chapter Secretary.

Cincinnati—M. F. Milligan, The Lunkenheimer Co., Cincinnati; Chapter Treasurer.

Chicago—Dean Van Order, Burnside Steel Foundry, Chicago; Assistant Chapter Secretary and Reporter.

Metropolitan—H. C. Seidel, Penn-Rillton Co., New York; Chapter Director.

New England Foundrymen's Assn.—Merton A. Hosmer, Hunt-Spiller Mfg. Corp., Boston; Group Reporter.

Northeastern Ohio—Edwin Bremer, *The Foundry.*

Quad City—H. L. Creps, Frank Foundries Corp., Moline, Ill.; Chapter Secretary-Treasurer.

Philadelphia—Wm. S. Thomas, North Bros. Mfg. Co., Philadelphia; Chapter Director, Chairman Publicity Committee.

Rochester—D. E. Webster, American Laundry Machinery Co., Rochester; Chapter Secretary-Treasurer.

Texas—H. L. Wren, Barada & Page, Inc., Houston; Chapter Secretary-Treasurer.

Twin City—Alexis Caswell, Manufacturers' Assn. of Minneapolis, Inc., Minneapolis; Chapter Secretary-Treasurer.

Western Michigan—C. H. Cousineau, West Michigan Steel Foundry Co., Muskegon, Mich.; Chapter Secretary.

Wisconsin—Darold W. Thiem, Pollard Oil Products Co., Milwaukee; Chapter Publicity Chairman.

the Lynchburg Foundry Co., Lynchburg, Va.

Mr. Scobie is interested to learn of the activities of the following, whom he has been unable to contact: Fred Brandt, Donald Eyeberg, Gilbert M. Falk, Russell Gunderson, Merle Kinkela, Howard W. Nicol Rudy Schumer.

The following alumni of the Student Chapter at the University of Minnesota are in the armed forces: L. J. Carlson, Harry Dahlberg, M. B. Olson, F. C. Priest, Stanley Sawina, Arthur Schwartz, S. S. Silberg, Eugene Shelley, D. S. Taber, John Uppgren and Frank Ilenda.

The above shows that the Student Chapter at the University of Minnesota may be well proud of the part which its alumni are playing in this great war for freedom, both in industry and in the armed forces.

Texas Begins Series of Regular Meetings

By H. L. Wren

MEMBERS of the Texas Chapter have settled down to a regular routine, as indicated at the January 14 meeting at the Houston Country Club, Houston, when the session had all the aspects of a veteran organization.

Chapter Chairman F. M. Wittlinger, Texas Electric Steel Castings Co., Houston, presided, and introduced N. J. Dunbeck, Eastern Clay Products, Inc., Eifort, Ohio, the principal speaker of the occasion. Mr. Dunbeck's speech dealt with the advantages of changing the properties of sand to conform with the work at hand.

Fifty-five foundrymen attended the meeting, at which the announcement was made that the chapter membership committee is regularly receiving membership acknowledgments.

New England Foundrymen Hold Annual Meeting

By M. A. Hosmer

THREE hundred members of the New England Foundrymen's Asssociation attended the annual meeting, January 12, at Hotel Gardner, Boston, when the election of officers and annual reports comprised the "business of the day."

The following were elected:

President: T. C. Weiser, Griffin Wheel Co., Chelsea, Mass.
Vice-President: M. A. Hosmer, Hunt Spiller Mfg. Corp., Boston.
Treasurer: A. W. Gibby, Boston.
Secretary: E. F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass.

The Executive Committee includes:

H. A. Hosmer, Hunt Spiller Mfg. Corp., Boston.
B. W. Hagerman, Rice-Barton Corp., Worcester, Mass.
D. L. Parker, General Electric Co., Lynn, Mass.
A. F. Dockey, H. & B. American Machine Co., Pawtucket, R. I.
F. M. Fitzgerald, Draper Corp., Hopedale, Mass.
C. A. Reed, Rogers-Brown-Lavino Co., Cambridge, Mass.

(Photos courtesy John Bing, A. P. Green Fire Brick Co.)

There was plenty of laughter at the Schroeder Hotel, Milwaukee, as the Wisconsin Chapter Christmas party got into full swing.

The Hydro-Arc Furnace Corp., LaGrange, Ill., which has been associated with the Whiting Corp., of Harvey, Ill., recently has been acquired by the Whiting organization.

(Photo courtesy S. B. Hutchinson, Hutchinson & Sons)

A view of the large attendance at the "Gates and Risers" meeting, held recently by the Ontario Chapter.

Abstracts

NOTE: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.

When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th Street, New York, N. Y.

Abrasives

CUT-OFF WHEELS. *(See Cleaning.)*

Aluminum

ALLOYING ELEMENTS. *"Effects of Minor Alloying Elements on Aluminum Casting Alloys,"* W. Bonsack, *A.S.T.M. Bulletin*, No. 124, October, 1943, pp. 41-51. The author discusses the effects of iron, copper, magnesium, manganese, zinc, nickel, tin, lead, antimony, bismuth, titanium, and chromium in aluminum-silicon alloys.

MELTING. *"Metallurgical Factors in the Founding of Aluminum Alloys,"* S. A. E. Wells, *The Metal Industry* (London), vol. 63, No. 8, August 20, 1943, pp. 114-117; vol. 63, No. 9, August 27, 1943, pp. 139-140. (This paper was recently presented to London branch of Institute of British Foundrymen.) In melting aluminum, the crucible is frequently a source of contamination by solid substances. In the case of graphite-clay or silicon-carbide crucibles, probably the only contamination which will occur is through the detachment of particles from the inside of the crucible. When melting in an iron or steel crucible, however, there is always the possibility of picking up iron by actual alloying. To counteract this, iron or steel crucibles are covered with a suitable wash each day, but the freedom from contamination depends upon the condition of this wash lining. Oxide contamination is also frequent in aluminum alloys. Oxides which form on the surface of the metal may be introduced into the metal by careless stirring, or stirring or making additions without first carefully removing the oxide layer. Oxides are of nearly the same density as the aluminum alloy itself. Therefore, they do not separate from the melt by the action of gravity, and it is necessary to use a flux to effect their removal. If a temperature over 750°C. is reached in melting aluminum alloys, the metal will solidify with an undesirable coarse grain. The metal may be heated above this temperature without incurring a coarse grained structure when certain grain refining elements are added to the alloy. Columbium, titanium, and boron have been used for this purpose. Columbium and titanium are added in the form of hardeners, while boron is usually introduced through a salt incorporated in a flux. Only small percentages of these elements are needed to refine the grain and amounts used should not be over those which will effect the maximum amount of grain refinement. Aluminum has a great affinity for hydrogen gas, eagerly taking up hydrogen from many sources, but particularly from moisture in the furnace, fluxes, crucible, etc. A condition known as "pinholing" or "speckling" results from this gas absorption. Means have been developed for degassing the metal. Older methods involved either much time or complicated equipment, but recently developed fluxes make gas removal simple. The fluxes are of the type which by chemical action evolve some gas, like chlorine. Experiments have proven that remelting does not alter the composition of aluminum alloys, but that re-fluxing an alloy containing magnesium does alter the magnesium content. Therefore, if flux is added to the metal, or if a large proportion of the charge consists of return scrap which has been previously fluxed, it will be necessary to replace some of the magnesium in the alloy.

Boron

ALLOYING. *(See Steel.)*

Bronze

GUN METAL. *"Navy Makes Gun Metal Castings,"* Ely Portman, *The Foundry*, vol. 71, No. 10, October, 1943, pp. 117, 198. The author describes the making of sound gun metal castings, emphasizing the charging method.

Cast Iron

PROMOTION. *"High-Strength Cast Irons for Machinery Parts," Product Engineering*, vol. 14, No. 10, October, 1943, pp. 659-662. This article consists of descriptions, accompanied by illustrations and drawings, of parts now cast from high-strength iron which formerly were cast from other alloys or fabricated by processes other than casting.

TORSION IMPACT PTOPERTIES. *"Heat Treatment Effect on the Torsion Impact Properties of Meehanite,"* C. R. Austin and M. M. Lipnick, *The Iron Age*, vol. 152, No. 15, October 7, 1943, pp. 54-55. The authors present the results of torsion impact tests performed on Meehanite metals which were tempered after oil quenching from 1550° F. Results are shown graphically, as well as in tabular form.

Castings Promotion

CAST IRON. *(See Cast Iron.)*

Centrifugal Casting

CENTRIFUGAL LOST WAX PROCESS. *(See Lost Wax Process.)*

Cleaning

CUT-OFF WHEELS. *"Using Abrasive Cut-Off Wheels,"* F. A. Upper, *The Foundry*, vol. 71, No. 10, October, 1943, pp. 115, 193-195. The author describes the applications of cut-off wheels, types of cut-off machines, abrasives and bonding materials used in abrasive wheels, and causes of wheel breakage.

Converter

STEEL REFRACTORIES. *(See Refractories.)*

Cores

CORE BOXES. *"Constructing Boxes for Blowing Cores,"* R. F. Lincoln and E. J. Swink, *The Foundry*, vol. 71, No. 10, October, 1943, pp. 106-107, 202-205. The authors describe the design and construction of metal core boxes for core blowing.

CORE MOLDS. *"Stern Frames Cast in Cores,"* Pat Dwyer, *The Foundry*, vol. 71, No. 10, October, 1943, pp. 98-101, 192. The author describes the making of patterns and cores for core molds for large steel castings.

Crucibles

CONSERVATION. *(See Melting Equipment.)*

Cutting Fluids

RECOMMENDATIONS. *(See Machinability.)*

Fatigue Tests

STEEL. *"Report of the Research Committee on Fatigue of Metals," A.S.T.M. 1943 Preprint 42*, 13 pp. The principal part of this report is a paper entitled "Second Progress Report on the Effect of Size of Specimen on Fatigue Strength of Three Types of Steel," by H. F. Moore and D. Morkovin. The following is a synopsis of this paper. Further tests on the effect of size on the fatigue strength of notched specimens of two plain carbon steels (S.A.E. 1020 and S.A.E. 1035) and on one heat-treated chromium molybdenum steel (S.A.E. X4130) have been made at the Talbot Materials Testing aboratory at the University of Illinois. The results of these tests have been correlated with the results of tests of unnotched specimens of the same steels reported last year. The scheme of cutting specimens of different

sizes from the bars of steel, and the testing machines used were the same as reported last year. The tests showed a tendency for the endurance limit of the steels tested to become constant for notched specimens 1 in. in diameter and larger. This was in harmony with the results reported last year for unnotched specimens. It is highly desirable that this result should be checked by tests of still larger specimens along with corresponding tests of smaller specimens, taking great care to reduce variations of strength within the bars of the metal. Comparisons of theoretical and actual reductions of fatigue strength by notches were made, and it was found that the steels tested came nearer to following the maximum distortion-energy theory (sometimes called the maximum shear strain-energy theory) than to following the common maximum stress theory or maximum shear-stress theory. Notch sensitivity factors for the different steels were determined by both stress and energy theories and for the different sizes of specimen tested. Curious behavior of the notch sensitivity factors for small sizes of notched specimens was observed, corresponding to marked deviation of their endurance limits from those predicted by the theories. Considerable use is made of Neuber's theoretical treatment of stress concentration, but his semi-empirical correction for relative size of the stress raiser and grain size, giving "technical stress concentration factor," was found not applicable to the fatigue data herein reported. A diagram is given with the intention of facilitating approximate estimating of endurance limits of members of any size if the endurance limit of a geometrically similar specimen of the same metal but of a different size is known.

Gray Iron

INGOT MOLDS. *"Thermal Stresses in Ingot Molds,"* T. Land, *Paper No.* 20—1943 *of the Committee on the Heterogeneity of Steel Ingots, The Iron and Steel Institute Advance Copy,* March, 1943, 19 pp. Cracking, caused by the thermal stresses set up during the casting of ingots, is a frequent cause of ingot-mold failure. A more exact knowledge of the effect of ingot-mold shape and the properties of the ingot-mold iron on the magnitude of the thermal stresses would be of immediate practical value. With this consideration in mind the thermal stresses under certain conditions have been calculated. The paper has been divided into two parts. In Section 1 of Part I, the stresses in a long circular mold have been calculated on the assumption that the physical properties of the ingot-mold iron are independent of temperature and of stress. It is shown that under these conditions the stresses at the outer surface would be roughly equal to the ultimate strength of the ingot-mold iron. The stresses in a very thin mold exceed those in one of normal thickness by about 20 per cent. In Section 2 the theory is developed to take account of the plastic deformation and varying physical constants of the cast iron, and in these circumstances the stresses are shown to be approximately half the ultimate strength of the mold material. Section 3 deals with molds of non-circular section and Section 4 with end effects. In Section 5 it is pointed out that the surface stresses can be calculated from measurement of the temperature and expansion of the outer mold surface, and the exact relationships are set out. Arising out of this investigation suggestions are made for future experimental work. Part II of the paper gives the detailed mathematical analysis discussed under Section 1 of Part I.

Hardenability

ALLOYING ELEMENTS. *(See Steel.)*

Heat Treatment

EFFECT ON TORSION IMPACT PROPERTIES. *(See Cast Iron.)*

Hydrogen

DETERMINATION IN STEEL. *(See Steel.)*

Ingot Molds

THERMAL STRESSES. *(See Gray Iron.)*

Lost Wax Process

PRECISION CASTINGS. *"Precision Castings for Ordnance and Aircraft,"* J. D. Wolf, *Metals and Alloys,* vol. 18, No. 4, October, 1943, pp. 784-788. The centrifugal lost wax process, formerly used almost exclusively in the making of jewelry, is now proving useful in the production of small precision parts for ordnance and aircraft. In most cases the use of the centrifugal lost wax process has resulted in substantial savings in material and machining operations.

Machinability

RATINGS AND CUTTING FLUIDS. *"Machinability Ratings of Metals and Cutting Fluid Recommendations,"* O. W. Boston, H. L. Moir, W. H. Oldacre, and E. M. Slaughter, *Metal Progress,* vol. 44, No. 4, October, 1943, pp. 622-624A. The authors present a tabulation of machinability ratings of various metals as estimated by users, using the machinability of A.I.S.I. steel specification B1112, cold rolled or cold drawn, when machined with a suitable cutting fluid at 180 ft. per min. under normal cutting conditions, as a basis for ratings. The authors also make some general recommendations concerning the use of cutting fluids with various alloys.

Magnesium

FIRE PREVENTION. *(See Safety.)*

FOUNDRY PRACTICE. *"Magnesium Casting Practice," The Iron Age,* vol. 152, No. 10, September 2, 1943, pp. 57, 147. This article is an account of a short paper presented by J. P. P. Jones for a competition of the London Branch of the Institute of British Foundrymen. Magnesium has a great affinity for oxygen, and so in melting, all possible precaution must be taken to prevent the metal burning or oxidizing. The metal must be covered with a flux at all times during melting. As the flux combines with oxygen, it sinks to the bottom of the crucible, and must be replaced at intervals by new flux. Care should be taken to skim all flux from the metal before pouring to prevent its getting into a mold. Flux inclusions are hygroscopic and therefore greatly increase the corrosion problems encountered with the use of magnesium. Moisture in molding sand should be kept at a minimum, and inhibitors are commonly added to the sand. In pouring, care should be taken to prevent turbulence or disturbance of the metal. If chills are used in the mold, moisture should not be allowed to condense on these. Mild steel pots should be used for melting. It is good practice not to completely empty the pot, for the oxides have a tendency to settle and collect on the bottom. However, these oxides should be removed from the crucible before the next heat.

Malleable Cast Iron

MARINE CASTINGS. *"Some Aspects of the Production of Malleable Iron Castings,"* J. Roxburgh, *Foundry Trade Journal,* vol. 70, No. 1410, August 26, 1943, pp. 341-345; vol. 71, No. 1411, September 2, 1943, pp. 9-14; and vol. 71, No. 1412, September 9, 1943, pp. 29-33. In this paper, which was read at the Fortieth Annual Conference of the Institute of British Foundrymen, the author discusses synthetic molding sands, bentonite substitutes, density of ramming, shrinkage, gating and feeding, the use of chills, and the use of molding machines for production work. The author's foundry originally used natural bonded sands, but after satisfactory experiments, changed over to a synthetic sand of silica and bentonite. When bentonite was no longer available, they substituted Fulbond No. 1 and obtained even better results. It was found that synthetic sand, when used for malleable castings, could be rammed three to four times harder than natural-bonded sands, thus making the skill in molding somewhat less critical. Iron for malleable castings is poured at a high temperature and has a large freezing range. Therefore, the chances for shrinkage to occur are considerable. To counteract this, heavy parts of castings must be properly fed, and much attention should be given to the location, kind, and size of risers used. Correct gating will keep the amount of slag formed at a minimum. Chills should not be used when proper feeding will produce sound sections. However, when necessary, the results produced by the use of chills are good. Sometimes chills and risers may be used together to secure sound castings. Feeders should present a minimum amount of cooling surface for the volume of metal they contain. With this in mind, a spherical shaped feeder becomes the best choice. When feeders are placed above the casting, the author has had success with a spherical feeder, of which the top part of the sphere was formed by a sand core provided with a hole through which metal could be added. This type of feeder, although being open to the top surface, has a minimum of cooling surface, and the core helps retain heat.

Melting Equipment

CRUCIBLES. *"Crucibles Need Care,"* Fred L. Wolf, *The Foundry,* vol. 71, No. 9, September, 1943, pp. 105, 172-173. Crystalline graphite, the essential ingredient in clay-graphite and silicon-carbide-graphite crucibles, is found in the United States, but not in sufficient quantities to satisfy the demands for all its uses. Much of the best graphite is imported from Madagascar. Since shipments of graphite are apt to be uncertain for the balance of the war, it is necessary that we give crucibles in service the best possible care in order to prolong their life and conserve our supply of crystalline graphite. In coke-fired furnaces, there should be at least three inches of coke

space between the furnace and crucible walls, and at least six to ten inches of coke under the crucible. In oil- and gas-fired furnaces, space between crucible and furnace walls should be kept at a minimum. Melting times should be as short as possible. The practice of allowing metal to soak should also be avoided, for this will materially shorten crucible life. Crucibles should be stored in a dry place. After drying, clay-graphite crucibles should be brought to working temperature slowly. Tongs should be properly fitted to the crucible for which they are used. Crucibles should never be dragged across the floor, but should always be lifted by tongs. Fluxes and furnace atmospheres should be carefully watched to prevent their attacking the crucible.

Non-Ferrous Melting

CRUCIBLE CARE. *(See Crucibles.)*

Open Hearth

SLAGS. *(See Steel.)*

Reclamation

TOOL REMOVAL. *"Electrochemical Removal of Broken Tools,"* J. L. Bleiweis and A. J. Fusco, *Metals and Alloys,* vol. 18, No. 5, November, 1943, pp. 1075-1080. Electrolytic or chemical removal of broken tools from drilled or threaded holes has made possible the salvage of parts which otherwise would have been scrapped. If the tool metal is made the anode in the proper electrolyte, it will dissolve selectively in the electrolyte. Apparatus has been developed which makes it possible to localize the tool area, thus obviating the necessity to immerse the entire part and protecting other metal inserts or painted surfaces. This method is especially suitable for use with aluminum castings. Broken tools may also be removed from various metals by means of straight chemical immersion.

Refractories

CONVERTER REFRACTORIES. *"Refractories for Side-Blow Converters,"* L. L. Gill, *Industrial Heating,* vol. 10, No. 10, October, 1943, pp. 1535-1536, 1538, 1540, 1542, 1544. The author describes the method of installing, drying and preheating, maintenance, and factors affecting the life of converter linings.

Safety

MAGNESIUM FIRES. *"Magnesium Fires Can Be Prevented,"* Robert S. Moulton, *The Foundry,* vol. 71, No. 10, October, 1943, pp. 111, 196-197. The author discusses the causes, preventative measures, and means of extinguishing magnesium fires.

Safety and Hygiene

BURNS. *"Treatment of Burns,"* Charles C. Lund, *Quarterly of the National Fire Protection Association, Part I,* vol. 37, No. 2, October, 1943, pp. 111-116. This article discusses the present trend away from escharotic treatments and toward the use of pressure dressings and plaster casts in the treatment of burns. It also discusses shock treatment, complications of burns, and dangers and prevention of infection.

Slags

OPEN HEARTH. *(See Steel.)*

Steel

BORON ADDITIONS. *"Boron Assumes a Position of Importance as an Alloying Element in Steel,"* Arthur F. Macconochie, *Steel,* vol. 113, No. 16, October 18, 1943, pp. 106, 108, 129. Austenitic grain size, homogeneity of the austenite, and austenite-pearlite transformation time are factors which control hardenability. Boron, in the proper amounts, increases the austenite-pearlite transformation time and thus increases hardenability of a steel. Boron should be used in amounts which are much smaller than those of other elements added to increase hardenability, and the boron must be protected from oxidation during the melt. Improved analytical methods make it possible to accurately determine the residual boron in boron-treated steels. In addition to increasing hardenability, boron additions also increase toughness and improves the machinability of fine-grained steels. Only recently has boron been used to increase hardenability. In the past, experimental additions were made on the same scale as for other alloying elements, and the value of boron was not appreciated until it was discovered that boron is effective only when used in very small amounts.

CONVERTER REFRACTORIES. *(See Refractories.)*

HARDENABILITY. *Effect of Sixteen Alloying Elements on Hardenability of Steel,"* Irvin R. Kramer, Robert H. Hafner, and Stewart L. Toleman, Technical Publication No. 1636, *Metals Technology,* vol. 10, No. 6, September, 1943, 11 pages. The authors studied the effects of various elements on the hardenability of steel by adding suitable amounts of alloying elements to experimental heats and then determining hardenability by means of end-quench hardenability specimens. They compared their results with work done by other investigators. They found the effect of nickel, chromium, molybdenum and copper to be very close to that reported by Grossman. Their results on manganese agree with those found by Crafts and Lamont. Silicon was found to have a greater effect than reported by either Grossman or Crafts and Lamont. They found that beryllium, arsenic, antimony, tin, and aluminum increase hardenability; cobalt, columbium, titantum, and tellurium decrease hardenability; germanium has no effect on hardenability.

HYDROGEN DETERMINATION. *"Determination of Hydrogen in Steel,"* W. C. Newell, *Canadian Metals and Metallurgical Industries,* vol. 6, No. 9, September, 1943, pp. 31-33. The vacuum-heating method for determination of hydrogen in steel has possibilities for displacing the vacuum-fusion method which has become a standard method. The apparatus for the vacuum-heating method is quite simple, temperatures used are much lower than those used in the vacuum-fusion method, errors resulting from the blank are negligible, and accuracy of determination is high. Hydrogen in steel becomes significant when amounts as small as 0.0001 per cent are present. There have been several attempts to express hydrogen content in units other than per cent, but most of these expressions give undue emphasis to the hydrogen present.

INGOTS. *"Solidification and Cooling of Steel Ingots,"* E. F. Law and Vernon Harbord, *Iron and Steel (British),* vol. 17, No. 2, October 21, 1943, pp. 53-57. This paper presents the results of detailed microscopical examinations of sections of killed medium-carbon steel, low-carbon rimmed steel, and ingot-iron ingots. The paper is illustrated by photomicrographs.

OPEN HEARTH. *"The Physical Chemistry of Open-Hearth Slags,"* James White, *Advance Copy, The Iron and Steel Institute,* August, 1943, 116 pp. The principal oxides occurring in open-hearth slags are CaO, MgO, MnO, FeO, Fe_2O_3, Al_2O_3, P_2O_5 and SiO_2, and a knowledge of the systems formed by these oxides with each other is essential to an understanding of the nature of the slag and of its role in steel-making. In the present paper the available data concerning these systems are discussed and correlated, thermal equilibrium and phase diagrams are given where these are available, and probable forms of some of the as yet unknown diagrams are suggested on the basis of published information. Particular attention is paid to the equilibria governing the relationships between the oxides of iron and gaseous oxygen on the one hand, and between these oxides and metallic iron on the other. The modifying effects produced by the presence of other oxides on these relationships are also discussed under the headings of the appropriate systems. Hence, the mechanism of gas oxidation in the furnace is briefly discussed. On the basis of the data thus presented the question of the constitution of actual furnace slags is discussed, and a tentative scheme of phase assemblages in solidified basic slags is put forward, which, it is hoped, may serve as a basis (to be proved or amended) for further work on the subject. Fusibility and fluidity relationships in furnace slags are also considered in so far as they limit the range of "workable" compositions. Finally the question of the molecular is briefly discussed.

LEADED ALLOY STEEL. *"Leaded Manganese-Molybdenum Steel,"* T. Swinden, Advance Copy, Paper No. 13/1943 of the Alloy Steels Research Committee, *The Iron and Steel Institute,* 20 pages. Tests were carried out on material from a non-leaded and a leaded ingot of manganese-molybdenum steel in order to determine the effect of lead (0.19%) on the mechanical properties, including the machinability. The leaded steel had a slightly coarser inherent grain size and less depth-hardenability than the non-leaded steel. The properties measured in the tensile test at room temperature were similar for the two steels in the form of flat and round bars. The notched-bar impact toughness of the leaded steel at room temperature was rather less than that of the non-leaded steel. At elevated temperatures the maximum-stress values of both steels were similar, but the ductility, as measured by elongation and reduction of area, was lower in the case of the leaded steel, particularly in the transverse direction. The Izod impact

values of the leaded steel also were lower at elevated temperatures. The Barr-Bardgett creep-stress values of the two steels at 500° C. were identical, whilst no significant difference was shown by the figures for damping capacity. When treated to a tensile strength of 65 tons per sq. in. the fatigue ratio and notch sensitivity (rotary bending) of the two steels were similar. When treated to the lower tensile strength of about 55 tons per sq. in. the non-leaded steel had a higher fatigue ratio (rotating cantilever) and slightly greater notch sensitivity than the leaded steel. The fatigue ratio (direct stress) of the non-leaded steel compared with the leaded steel was slightly higher when treated to 65 tons per sq. in. and slightly lower when treated to about 55 tons per sq. in. The machinability of the leaded steel was markedly superior to that of the non-leaded steel.

Torsion Impact Properties

EFFECT OF HEAT TREATMENT. *(See Cast Iron.)*

Zinc-Base Alloys

CAST DIE WEDGES. *"Casting Die Wedges for Light Metal Flanging."* Leonard C. Costello, *The Iron Age,* vol. 152, No. 18, October 28, 1943, pp. 70-73. Dies used to form convex flanges on light metal sheets in the Inglewood, Cal., plant of North American Aviation, Inc., are constructed largely of Masonite. However, the dies include wedges which are made of a zinc-base alloy. Patterns for the wedges are made of plaster of Paris poured in the die itself. The wedges are poured in a two-part sand mold. Each wedge is separately gated. On removal from the mold, the wedges are finished and given a final ground finish. Pins are located at the edge of the wedges to locate them in the die. A detailed description of the operation of the die in the flanging process is given by the author.

Schedule of February Chapter Meetings

February 5

Rochester
Hotel Seneca, Rochester
WILLIAM CONLEY
Lincoln Electric Co.
"Foundry Variables and Their Effects on Castings"

✦

Western New York
Joint Meeting with Rochester Chapter

✦ ✦

February 7

Central Indiana
Athenaeum, Indianapolis
E. T. KINDT
Kindt-Collins Co.
"Pattern Night"

✦

Chicago
Chicago Bar Assn. Restaurant
J. H. VAN DEVENTER
The Iron Age
"The Future of Castings"

✦

Metropolitan
Essex House, Newark, N. J.
Discussion Meeting
"Selection and Use of Foundry Equipment"

✦ ✦

February 8

Northern Illinois-Southern Wisconsin
Hotel Hilton, Beloit, Wis.

✦ ✦

February 9

Michiana
Notre Dame, Ind.
Joint Meeting with N.D. ASM
"Gray Iron Castings"

✦ ✦

February 10

Northeastern Ohio
Cleveland Club, Cleveland
"QUIZ NIGHT"

✦

St. Louis
DeSoto Hotel, St. Louis

February 10-11

Wisconsin
Hotel Schroeder, Milwaukee
7TH REGIONAL FOUNDRY CONFERENCE

✦ ✦

February 11

Central New York
Onondaga Hotel, Syracuse, N. Y.
MAX KUNIANSKY
Lynchburg Foundry Co.
"Use of Scrap in Cupolas"

✦

Northern California
Claremont Hotel, Berkeley
N. M. BRISKIN
Permanent Metals Corp.
"Magnesium Sand Castings"

✦

Philadelphia
Engineers Club, Philadelphia
ROUND TABLE MEETING
"Foundry Trouble Shooting"

✦

Southern California
Elks Club, Los Angeles
R. C. JOHNSON
"Foundry Shake-outs and Their Value to the Operator"

✦ ✦

February 14

Cincinnati
Cincinnati Club
V. A. CROSBY
Climax Molybdenum Co.
"Factors Affecting Cast Iron"

✦

Western Michigan
Hotel Ferry, Grand Haven, Mich.
J. J. BOLAND
Griffin Wheel Co.
"Relationship of Sand Control to Better Castings"

✦ ✦

February 17

Detroit
Rackham Educational Memorial, Detroit
O. F. CARPENTER
Packard Motor Car Co.
"British Foundry Technique"
ROUND TABLE MEETINGS

February 18

Birmingham

✦

Eastern Canada and New Foundland
Mt. Royal Hotel, Montreal
ROUND TABLE MEETING
Iron, Bronze and Steel

✦ ✦

February 19

Chicago
Hotel Morrison, Chicago
ANNUAL LADIES' NIGHT

✦ ✦

February 21

Quad City
Ft. Armstrong Hotel, Rock Island, Ill.
GEO. A. SCHUMACHER
Benton Harbor Malleable Industries

✦ ✦

February 22

Toledo
Waldorf Hotel, Toledo
L. M. LONG
Battelle Memorial Institute
NON-FERROUS NIGHT

✦ ✦

February 25

Chesapeake
Engineers' Club, Baltimore
W. G. REICHERT
Reichert Engineering Co.
"Control of Sand"

✦

Ontario
Royal York Hotel, Toronto
ROUND TABLE MEETINGS
Malleable, Grey Iron, Non-Ferrous
"Wartime Metals"

✦

Texas
Houston Country Club, Houston
A. W. GREGG
Whiting Corp.

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